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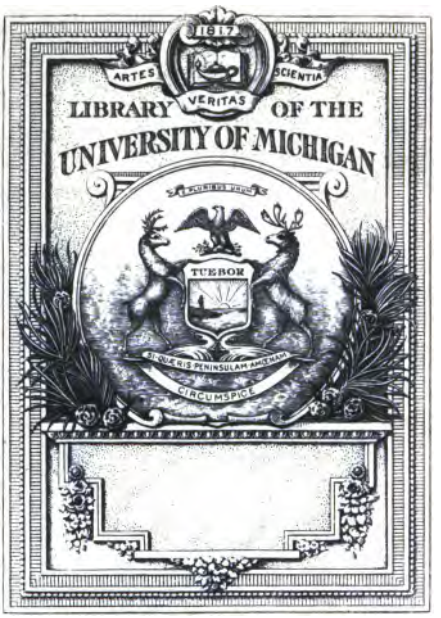

A

TREATISE

OF

PRACTICAL ARITHMETIC

AND

Book-Keeping,

BY

SINGLE ENTRY.

THE FIFTH EDITION, MUCH IMPROVED.

BY

WILLIAM TINWEL,

TEACHER OF THE MATHEMATICS.

Newcastle:

PRINTED BY M. ANGUS AND SON, FOR THE AUTHOR.

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PREFACE.

THE intention of publishing this system is to render the study of Practical Arithmetic *as easy as possible, and to remove those redundancies which are too often found in books of this kind. For every discerning teacher will allow, that the principles of any art cannot be laid down in too easy and plain a manner. In pursuance of this design, care has been taken, especially in the first simple rules, not to harass the scholar with any thing foreign to the rule he is learning. Addition, Subtraction, Multiplication, and Division, are treated first in integers; where the scholar is troubled with nothing but merely to add, subtract &c. after which the manner of arranging the questions according to the rule is taught: and lastly, the numbers in the questions are given in words at length, which not only exercise the two first parts, but also exemplify Notation.*

As a further exercise, a large promiscuous collection of questions is given to the first five rules.

In Reduction will be found a great many questions different from those commonly given, all tending to instruct, but none to puzzle the learner.

Then follows a promiscuous collection of questions to illustrate all the parts of Reduction. The compound rules come next in order, at the end of which will be found several bills of parcels, and book-debts, together with a number of questions for exercise. In the Rule-of-Three a rational and plain method is given to work all the questions belonging to it, whether direct or inverse, This rule is of such extensive use, that the utmost care should be taken to render it familiar to the young accountant. The Rule-of-Five, as it is here entirely founded upon the Rule-of-Three, will be found, upon trial, very easy.

Practice,

Practice, being of such material use in real business, is very amply handled; as is also Tare and Trett and Bills of Parcels. It must be allowed, that, according to the proper order of teaching, Vulgar Fractions should have been put before Practice, as the reasons for the operations in that rule are entirely founded upon them. But as there are a great many who have not time to learn a complete system of Arithmetic, such ought to be taught the order of the rules as they follow one another, and then Book-keeping by Single Entry, which is sufficient for common business. But in order to make a person expert in calculations, Vulgar Fractions are absolutely necessary, for which reason they are very copiously treated, and the various methods laid down in a clear manner.

In Decimal Fractions, besides what is generally given, single circulates, or repeaters, are introduced, as they occur so often in measuring by feet and inches. Exchange with foreign countries will be found more full and extensive than usual. Duodecimals is followed by a number of useful questions in squaring dimensions, the utility of which is obvious. Book-keeping by single entry, although it is placed at the end of the Arithmetic, may be learned as soon as the scholar has gone through the promiscuous collection of questions after Practice. The several accounts in the Day-book are so collected and arranged as to serve for a general exercise to all the practical rules, therefore very much care should be taken to make the learner well acquainted with them.—A small Appendix is added, containing Receipts, Promissory Notes, and Bills of Exchange, with proper exercises.

This Edition is very much improved, as well with respect to a great number of new questions being introduced, as in the order and disposition of the former ones.

PRACTICAL ARITHMETIC.

DEFINITIONS.

1. PRACTICAL ARITHMETIC is the art of computing by numbers.

2. A Unit is any thing conſidered as one.

3. An Integer is any whole thing.

4. Integers, or whole numbers, are ſuch as expreſs any number of things, each of which is a unit.

5. An even number is that whoſe half is a whole number.

6. An odd number is that which cannot be divided into two equal whole numbers.

7. A ſimple number conſiſts only of one denomination.

8. A compound number conſiſts of ſeveral denominations.

9. A fraction, or broken number, is one part or more of an integer, and is expreſſed by two numbers, the one above and the other below a line drawn between them; the number below is called the *denominator*, and the number above the *numerator*:— Thus

$$\frac{4}{7}$$

4 Numerator.
7 Denominator.

10. A mixt number conſiſts of a whole number and a fraction, as $4\frac{4}{7}$

The following Signs are uſed in this Work.

= The ſign of equality, and ſignifies that the numbers it is ſet between are equal, as 16=16.

+ The ſign of addition, and ſignifies that the numbers it is ſet between are to be added, as 8+2=10.

— The ſign of ſubtraction, and ſignifies that the numbers it is ſet between are to be ſubtracted, as 8—2=6.

× The ſign of multiplication, and ſignifies that the numbers it is ſet between are to be multiplied, as 8×2=16.

÷ The ſign of diviſion, and ſignifies that the numbers it is ſet between are to be divided, as 8÷2=4.

$\surd$ The sign of the Square Root.
$\sqrt[3]{}$ The sign of the Cube Root.
: } Is to } Signs of proportion, as
: : } So is } 10 : 15 : : 30 : 45.

NOTATION.

By notation, any number is expreſſed by words or figures. From the ten fingers of the hand, on which, in ancient times, it was uſual to compute numbers, the ten figures were called digits. Their form, order, and value are as follows.

1, 2, 3, 4, 5, 6, 7, 8, 9, 0.
One, two, three, four, five, ſix, ſeven, eight, nine, cipher.

The value of every figure is altered according to the place it ſtands in. Thus

Sixth place.	Fifth	Fourth	Third	Second	First
4	4	4	4	4	4

A figure in the firſt place has only its own value, in the ſecond it has ten times that value, in the third a hundred times that value, &c. It is plain, from the above, that 4 in the firſt place denotes 4 units, in the ſecond four tens or forty, in the third four hundreds, &c.

A cipher, which of itſelf ſignifies nothing, being placed on the right of a figure, increaſes its value tenfold. So 50 ſtands for five tens, or fifty.

For the convenient reading of any number, begin at the right hand, and divide it into periods of ſix figures, and each period into two equal parts, as in the following

TABLE.

h. t. u. h. t. u.	h. t. u. h. t. u.	h. t. u. h. t. u.
6 1 7, 2 3 8	3 7 8, 6 4 3	9 5 3, 6 7 5
Quinquillions.	Quadrillions.	Trillions.

h. t. u. h. t. u.	h. t. u. h. t. u.	h. t. u. h. t. u.
8 4 5, 7 3 5	4 3 7, 6 9 3	9 2 4, 7 5 8
Billions.	Millions.	Units.

Whence, to expreſs any number in words, this is the

RULE.—Divide the number as in the Table, then begin at the left hand, and expreſs hundreds, tens, units, as you come to the places where theſe figures are; at the end of the firſt part of each period pronounce thouſands, and at the other end the name of the whole period.

Expreſs in words the following numbers.

14—29—48——79—123——524—896—1784—3704—6735——74067——267231——4678927——12340678—406987072——45670086572146——14607307215831——140783200673567674——210761432487148672—7214860532907918261427861427467—9436082754129430459215643644218——1234567890720006152260100008527 94.

To expreſs any number in figures,

RULE.—Put ciphers to as many periods and places as are mentioned in the given number; then begin at the left hand, and write the ſignificant figures in ſuch periods and places as the queſtion directs.

Expreſs in figures, Seventy—Six hundred—Nine hundred—Three thouſand—Seven thouſand—Forty thouſand—Eighty thouſand—Nine hundred thouſand—Eighteen—Thirty-four—Seven hundred and ſeventy-three—One thouſand ſeven hundred and eighty-four—Twenty three thouſand ſeven hundred and fifty—Four millions two hundred and ſeventy—Thirty five thouſand three hundred and forty millions—Four hundred and forty thouſand billions, three thouſand and eighty millions, ſix hundred and forty three—Four thouſand and fifty trillions—Seventy four billions, one hundred thouſand and ten millions, nine thouſand and four—Seventy quadrillions, forty five thouſand and ninety millions, ſixty ſix thouſand and eighty three.

SIMPLE ADDITION.

SIMPLE Addition teaches to find the ſum of two or more ſimple numbers.

RULE 1.—Place the numbers under each other, ſo that units may be below units, tens below tens, hundreds below hundreds, &c.

2. Add up the right hand column, and ſet down the units which are in the ſum, carrying the tens to the next.

3. Add up all the columns in the ſame manner, till you come to the left hand row, at which ſet down the whole ſum.

TO PROVE ADDITION.

Begin at the top, and add the queſtion down the ſame way as you added it up, if the ſum be the ſame as before, the work is right.

THE TABLE.

	1	2	3	4	5	6	7	8	9
1	2	3	4	5	6	7	8	9	10
2	3	4	5	6	7	8	9	10	11
3	4	5	6	7	8	9	10	11	12
4	5	6	7	8	9	10	11	12	13
5	6	7	8	9	10	11	12	13	14
6	7	8	9	10	11	12	13	14	15
7	8	9	10	11	12	13	14	15	16
8	9	10	11	12	13	14	15	16	17
9	10	11	12	13	14	15	16	17	18

7469	4137	7864	3471	397
2583	9488	9548	1357	6
6495	3414	4233	9246	7418
		8437	8376	6537
4157	4633	67	6721	
2478	2871	7695		2316
3889	6612	964	2681	9784
6123	2674		9483	3168
	4842	3483	6738	8997
7256	8547	1234	4291	1857
2613		6189	5042	6432

9	3	8	2
6	1	8	9
1	2	3	4
5	9	6	7
7	1	6	7
	7	4	5
6	2	5	3
9	7	4	6
8	1	3	5
	2	7	6
1	7	9	8
2	3	6	7
		9	4
6	1	5	4
8	7	2	9
7	2	6	8
3	9	1	7
6	4	2	1
8	3	5	7
8	9	7	0
3	5	4	2
	1	0	2
		6	3
2	1	3	5
7	2	6	4
8	1	6	7
		4	2
7	4	8	6
2	9	6	1
5	4	8	6
1	2	7	9
3	8	7	2
8	9	7	1
6	4	3	2
7	6	1	5
4	3	3	0
1	2	7	6
3	6	1	4

1	8	2	6
7	4	1	3
1	2	3	4
5	6	7	8
9	1	3	5
4	6	7	9
7	9	2	4
6	8	0	2
4	1	6	5
3	0	7	6
	3	7	2
		6	6
	1	4	8
	9	7	2
6	4	3	2
4	9	6	1
6	3	4	8
7	5	9	8
6	4	1	2
	7	6	4
1	2	9	6
			8
		3	2
7	6	4	3
1	8	2	7
6	4	3	5
9	7	4	8
2	6	9	3
7	4	4	3
8	7	6	8
6	4	8	2
4	6	1	3
5	6	2	6
4	5	7	8
5	3	2	1
7	8	4	0
		6	4
	3	7	6

		4	2
1	2	3	4
5	6	7	8
9	2	4	6
8	1	3	5
7	9	4	2
6	5	3	2
7	4	8	8
4	2	7	9
4	8	7	6
7	8	4	4
2	4	3	4
6	9	3	6
7	4	8	2
1	3	6	7
1	3	5	7
9	2	4	6
5	6	4	2
9	7	5	3
1	4	6	8
7	4	2	6
6	5	1	2
9	4	2	8
7	6	1	5
4	2	9	6
5	7	8	4
2	1	4	3
5	6	7	8
9	1	3	5
7	9	2	4
6	8	0	7
			6
		9	7
	4	1	8
			9
4	2	6	4
9	7	4	8
2	4	3	4
4	5	5	7

2	9	6	4
3	7	4	6
5	8	9	2
1	4	8	7
6	4	8	4
4	2	6	7
3	5	4	2
1	3	5	7
	9	2	4
6	8	1	2
3	4	5	6
7	6	1	4
3	5	0	2
4	2	6	9
3	7	2	6
4	1	0	7
2	6	1	3
1	4	0	7
			3
		6	7
			4
	8	7	2
9	6	5	4
6	4	2	9
3	7	4	8
2	6	3	5
7	9	8	4
1	0	6	7
4	2	7	9
1	3	7	8
6	4	2	1
4	3	5	5
6	4	2	6
3	9	8	2
4	1	6	7
2	9	8	4
4	1	7	6
3	7	4	2

6	7	9	3
4	1	6	8
1	2	6	1
4	2	6	9
7	9	8	4
1	3	2	6
5	7	4	8
9	2	4	3
6	4	8	2
4	9	6	4
8	2	7	9
6	4	5	7
2	3	6	1
7	4	6	9
9	7	5	3
6	0	1	4
		7	6
	4	8	3
2	9	6	3
			6
		9	4
			8
	4	1	7
6	2	4	2
1	7	4	6
2	4	6	5
		6	8
	1	4	2
9	7	5	3
1	2	4	6
			7
			6
		1	5
	2	3	4
3	3	5	5
5	6	7	8
	1	3	5
		2	4
	4	0	2

8	5	7	9	8	1	6	7	3	6	1	2	1	3	5	7		4	2	8
6	4	2	8	1	2	6	9	5	7	2	9	9	2	4	6			6	9
		4	8							8	7	8	3	7	4	8	6	9	4
	1	5	3	7	4	8	9				1	8	7	6	4	4	2	9	6
			8	2	6	9	3			1	0			8	7	3	6	8	4
7	1	6	4	4	8	9	6		1	0	1			5	4				
3	2	9	4	5	7	6	4	4	8	7					9				

Required the ſum of 748695487, 1784, 91278437, 123, 754689, 748, 143, 67, 7262, and 461732?

What is the ſum of 127, 76524, 78594, 335678, 6721843 26, 7614, 2615846, 723, 714, 62, and 8?

What is the ſum of 96, 5786, 41380, 7695, 816, 748673, 425784361, 716726, 12345, 8, 42, and 9?

Required the ſum of ſeven hundred and forty five—Three thouſand and fifty four—One hundred and ſeventy ſix thouſand—Eight millions, three hundred and forty thouſand, two hundred and ninety—Six thouſand and twenty millions, ſeventy three thouſand and fifty—Three hundred thouſand millions, eighty thouſand and thirty two—and ſeven millions, ſeven thouſand and ſeven?

Required the ſum of ſixteen—Ninety five—Eighty thouſand—One hundred and ſix thouſand, three hundred and forty—Seventy millions—Three millions, three thouſand and three—Ten thouſand five hundred and fifty two—and ſix hundred and forty three?

What is the ſum of ſeven billions, thirty five thouſand and four millions—Nine hundred and forty ſeven millions, nine hundred and eight—Eight thouſand and ſixty five—Five millions, and ninety ſix—Six hundred and two thouſand, three hundred and four—Forty thouſand and ſeventy five—and thirty four thouſand three hundred and five?

SIMPLE SUBTRACTION.

SIMPLE Subtraction teaches to find the difference between two ſimple numbers.

RULE 1.—Set the leſs number under the greater, in ſuch order, that units may be below units, &c.

2. Begin at the right hand, and take each under figure from that which ſtands above it, placing down their difference.

3. When the under figure is greater than the upper, take the under from ten, and to that difference add the upper, ſetting down the ſum, remembering, in this caſe, to carry one to the next under figure.

To prove Subtraction.

Add the difference and leſs number together, if their ſum be equal to the greater number, the queſtion is right.

The TABLE.

	1	2	3	4	5	6	7	8	9	10
1	0	1	2	3	4	5	6	7	8	9
2	-	0	1	2	3	4	5	6	7	8
3	-	-	0	1	2	3	4	5	6	7
4	-	-	-	0	1	2	3	4	5	6
5	-	-	-	-	0	1	2	3	4	5
6	-	-	-	-	-	0	1	2	3	4
7	-	-	-	-	-	-	0	1	2	3
8	-	-	-	-	-	-	-	0	1	2
9	-	-	-	-	-	-	-	-	0	1
10	-	-	-	-	-	-	-	-	-	0

7 2 1 4 6 8 8	9 5 7 8 4 3 6	7 8 4 6 1 3 4
4 1 1 2 1 6 2	2 4 1 6 2 1 4	2 6 1 3 1 2 2
9 4 8 5 6 7 7	6 2 7 9 8 7 4	8 8 4 7 2 1 7
3 3 7 6 4 3 6	2 4 6 2 5 6 3	4 7 5 6 2 7 4
4 2 6 7 8 4 6	6 7 4 5 5 6 7	8 9 7 4 6 2 1
3 7 2 1 6 3 8	4 8 2 6 1 4 9	6 3 8 6 2 7 8
6 7 2 8 6 9 0	2 1 0 8 6 4 2	8 9 7 0 6 2 1
4 8 6 0 8 2 7	1 8 7 2 8 6 0	6 8 0 5 6 2 6

What is the difference between 740865726 and 406734?
What is the difference between 1764075321 and 879643?
How much does 2784500764 exceed 98430784?

How much does seventy five thousand three hundred and twenty-five, exceed nine thousand five hundred and twenty?

How much does sixty-six millions, three hundred thousand, exceed ninety four thousand three hundred and seventy?

What is the difference between seven thousand millions, eight hundred and two thousand,—and six millions, thirty seven thousand and ninety eight?

SIMPLE MULTIPLICATION.

SIMPLE Multiplication teaches how to increase the *multiplicand*, or number to be multiplied, as often as there are units in the *multiplier*, or number you multiply by, and the number arising from thence is called the *product*. Sometimes the multiplicand and multiplier are named *factors*.

MULTIPLICATION TABLE.

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

CASE 1.

To multiply by any number less than thirteen.

RULE.—Set the multiplier under the unit's place of the multiplicand, and multiply every figure in it by the multiplier, setting down the units and carrying the tens, as in simple addition.

Multiply 7643058921 by every figure between two and thirteen.

CASE 2.

To multiply by any number greater than twelve.

RULE 1.—Place the multiplier under the multiplicand, in such order, that units may be under units, tens under tens, &c.

2. Begin at the right hand, and multiply by each figure in the multiplier, as in caſe firſt, obſerving to place the firſt figure of each product under the figure you are multiplying by.

3. Add up the ſeveral products, in the ſame order as they ſtand, and their ſum will be the product required.

To prove queſtions in multiplication, invert the factors and multiply as above, and if the product be the ſame, the queſtion is right.

1. 7605437894, by 25 —— *Anſ.* 190135947350.
2. 5720764839, by 34 —— 194506004526.
3. 4007387258, by 67 —— 268494946286.
4. 46376158, by 125 —— 5797019750.
5. 62704395, by 476 —— 29847292020.
6. 726158869, by 9481 —— 68847122369 89.
7. 51828976, by 406073 —— 21046347771248.
8. 642758409, by 730064 —— 469254775108176.
9. 726834933, by 6406098 —— 4656175810621434.

10. Multiply ſeven billions, thirty five thouſand three hundred and eighty four millions, thirty ſix thouſand three hundred and ſixty two; by ſeventy thouſand three hundred and nine.

Anſ. 4946508162125758 58.

11. Multiply ſixty five thouſand three hundred and eighty four millions, eight hundred thouſand two hundred and ſeventy; by nine millions, forty ſix thouſand two hundred and five.

Anſ. 591484307126475350.

12. Multiply thirty one millions, ſeven hundred and four thouſand, five hundred and ninety two; by two hundred and forty ſeven thouſand and fifty four.—*Anſ.* 7832746271968.

CASE 3.

When there are ciphers on the right of one or both factors.

RULE.—Neglect the ciphers, and with the remaining figures perform as in the former caſes: obſerving to annex as many ciphers to the right of the product as were neglected.

1. 6708400, by 321 —— *Anſ.* 2153396400.
2. 46127900, by 4700 —— 216801130000.
3. 123456000, by 123000 —— 15185088000000.
4. 5006430000, by 600 —— 3003858000000.
5. Required the product of ſix millions, thirty eight thouſand three hundred; by ninety four thouſand?

Anſ. 567600200 00.

6. Multiply ſeven thouſand three hundred millions, forty thouſand and eighty, by one hundred and five thouſand.

Anſ. 766504208400000.

7. Multiply ſeven billions, thirty millions, two hundred and thirty thouſand, by ſix hundred and fifty four thouſand.

Anſ. 4578019770420000000.

SIMPLE DIVISION.

SIMPLE Diviſion teaches to find how often one number is contained in another, or to divide a ſimple number into a certain number of equal parts. In diviſion there are four particular things, viz. 1. The *dividend*, or number to be divided. 2. The *diviſor*, or number to divide by. 3. The *quotient*, or number of times the dividend contains the diviſor. 4. The *remainder*, or what remains after the work is finiſhed.

DIVISION TABLE.

12	12	24	36	48	60	72	84	96	108
11	11	22	33	44	55	66	77	88	99
10	10	20	30	40	50	60	70	80	90
9	9	18	27	36	45	54	63	72	81
8	8	16	24	32	40	48	56	64	72
7	7	14	21	28	35	42	49	56	63
6	6	12	18	24	30	36	42	48	54
5	5	10	15	20	25	30	35	40	45
4	4	8	12	16	20	24	28	32	36
3	3	6	9	12	15	18	21	24	27
2	2	4	6	8	10	12	14	16	18
1	1	2	3	4	5	6	7	8	9

CASE I.

To divide by any number leſs than thirteen.

RULE.—Place the diviſor on the left of the dividend, and conſider how often it is contained in as many of the left hand figures of the dividend as will contain it leſs than ten times: ſet the number of times below the unit's place of the number you took to

contain the divisor in, if any thing remain, consider it as so many tens, to which annex the next figure of the dividend; consider how often the divisor is contained in this number, proceed in the same manner till all the figures of the dividend are used.

Note, What remains must always be less than the divisor.

To prove questions in division, multiply the quotient by the divisor, and to that product add the remainder; if the sum be equal to the dividend, the question is right.

Divide 760375849214, by every figure between two and thirteen.

Case 2.

To divide by any number greater than thirteen, which can be found in the multiplication table.

Rule.—Find the component parts of the divisor, and divide by one of them as in case first, and that quotient again by the other, will give the answer.

To find the true remainder, multiply the first divisor by the last remainder, and to that product add the first remainder.

The component parts of a number are such, that when they are multiplied together, they produce that number. Thus, the component parts of 42, are 6, and 7, because 6 times 7 produce 42, &c.

1. 760342865 by 16——*Ans.* $47521429\frac{1}{16}$
2. 421867952 by 27—— $15624738\frac{26}{27}$
3. 123456789 by 33—— $3741114\frac{27}{33}$
4. 708556426 by 42—— $16870391\frac{4}{42}$
5. 843076528 by 48—— $17564094\frac{16}{48}$
6. 72614899 by 56—— $1296694\frac{35}{56}$
7. 440076521 by 63—— $6985341\frac{38}{63}$
8. 27438942 by 77—— $356349\frac{69}{77}$
9. 993255670 by 96—— $10346413\frac{22}{96}$
10. 456789452 by 120—— $3806578\frac{92}{120}$
11. 659384206 by 132—— $4995334\frac{118}{132}$
12. 48673427412 by 144—— $338009912\frac{84}{144}$

Case 3.

To divide by any other numbers than those in the multiplication table.

Rule.—Find the first figure of the quotient by case first, and

multiply the divisor by it, setting the product orderly under the number which you took to contain the divisor in*, subtract it therefrom; bring down the next figure out of the dividend and place it on the right of it; consider how often the divisor is contained in this number, and proceed in the same manner till all the figures of the dividend be taken down. Observe, that for every figure taken down out of the dividend, a cipher or a figure must be put in the quotient.

1. 4216072 by 23—— *Anſ.* $183307\frac{11}{23}$
2. 4921359 by 34—— $144745\frac{29}{34}$
3. 6428c25 by 46—— $139739\frac{31}{46}$
4. 64237968 by 57—— $1126981\frac{51}{57}$
5. 12345678 by 67—— $184263\frac{57}{67}$
6. 70504237 by 75—— $1060056\frac{37}{75}$
7. 87904372 by 83—— $1059088\frac{68}{83}$
8. 96420651 by 98—— $983884\frac{19}{98}$
9. 642705342 by 124—— $5183107\frac{74}{124}$
10. 2174860748 by 236—— $9215511\frac{152}{236}$
11. 6659942974 by 379—— $17572408\frac{342}{379}$
12. 1764578921 by 465—— $3794793\frac{276}{465}$
13. 80395327674 by 582—— $138136301\frac{402}{582}$
14. 48672012349 by 637—— $76408182\frac{415}{637}$
15. 57286387244 by 842—— $68036089\frac{306}{842}$
16. 98211073286 by 942—— $104258039\frac{548}{942}$
17. 764206043241 by 2744—— $278500744\frac{1705}{2744}$
18. 495689552460 by 4807—— $103118275\frac{4535}{4807}$
19. 69554006732 78 by 26043—— $2670737 11\frac{17705}{26043}$
20. 46194553326724 by 87204—— $529729752\frac{33316}{87204}$

CASE 4.

When there are ciphers on the right of the divisor.

RULE.—Cut off the ciphers, and as many figures from the right of the dividend; then with the remaining figures perform as in the former cases. Observe to place the figures that were cut off the dividend to the right of the remainder.

* If the product be greater than the number it is to be subtracted from, the quotient figure is too much; and if the remainder be equal to, or greater than the divisor, the quotient figure is too little.

1. 4217329578 by 700 —— *Anſ.* 6024756$\frac{78}{100}$
2. 1642807347 by 6600 —— 248910$\frac{1347}{6600}$
3. 72146950640 by 96000 —— 751530$\frac{70640}{96000}$
4. 1876432451200 by 12400 —— 151325197$\frac{8400}{12400}$
5. 1234567890000 by 6740000 —— 183170$\frac{2000000}{6740000}$

CASE 5.

When there is a fraction in the diviſor.

RULE.—Multiply the whole number in the diviſor by the denominator of the fraction, and to this product add the numerator, the ſum will be a new diviſor: Alſo multiply the dividend by the denominator for a new dividend, then divide as before.

1. Divide 46104327 by $5\frac{2}{11}$

$5\frac{2}{11}$) 4 6 1 0 4 3 2 7
2 2

11) 9 2 2 0 8 6 5 4

8 3 8 2 6 0 4$\frac{10}{11}$

2. 64153674 by $30\frac{1}{4}$ —— *Anſ.* 2120782$\frac{78}{121}$
3. 6007842 by $7\frac{5}{6}$ —— 775205$\frac{50}{47}$
4. 7625896 by $14\frac{7}{10}$ —— 512665$\frac{33}{149}$
5. 234678 by $178\frac{2}{3}$ —— 1313$\frac{266}{536}$
6. 17846005 by $2\frac{1}{6}$ —— 8236617$\frac{8}{13}$

A promiſcuous Collection of Queſtions to exerciſe all the Caſes in the foregoing Rules.

1. What is the difference between 7164387 and 70643? *Anſ.* 7093744.
2. Multiply 9243600 by 7100 —— *anſ.* 65629560000
3. Divide 749358761 by 54 —— *anſ.* 13877014$\frac{5}{54}$
4. Required the ſum of 710, 63, 8725461, 729, 3514, 437153, 66427, and 1784? *anſ.* 9235841.
5. Expreſs in words 72308540076148227314861$\frac{5}{6}$.
6. Multiply 123468706 by 9 —— *anſ.* 1111218354.
7. Divide 72386154275 by 4861 —— *anſ.* 14884206$\frac{1009}{4861}$
8. Multiply 6480356617 by 628 —— *anſ.* 4069663955476.

9. Divide 1648321067400 by 7200 *anf.* 228933481$\frac{4200}{7200}$

10. Set down in figures, seven billions, one hundred thousand millions, and twenty five.

11. Divide 7168421234567 by 61400 *anf.* 116749384$\frac{11767}{61400}$

12. If the remainder of a division be 74, the divisor 152, and the quotient 72916; What is the dividend?— *anf.* 11083306.

13. The difference between two numbers is 7164289, and the less number is 67214; what is the greater? *anf.* 7231503.

14. Suppose a person was born in the year 1740, how old is he in the year 1805? — — — *anf.* 65.

15. If a person be 65 years of age, in what year was he born, this being 1805? — — — *anf.* 1740.

16. Express in figures, one trillion, eight thousand millions, seven hundred and seven.

17. Express in figures, six quadrillions, thirty-six billions, fifty millions, and ninety.

18. Add 1784, 381, 1000, 3728, 46951, 731647, 85426, 7, 81, 9710, and 1496 together. —— *anf.* 882211.

19. Add 14298, 6614, 20, 96, 2791438, 7, 8, 614, 12345, 72, 84, and 9 together. — *anf.* 2825605.

20. Suppose that there are twenty-five millions, three hundred thousand inhabitants in Germany—Twenty millions in Russia—Nine millions, one hundred and sixty thousand in Poland—Four millions in Sweden—Two millions, nine hundred thousand in Denmark and Norway—Two millions in Prussia—Three millions in Holland—Twenty-six millions in France—Thirteen millions, eight hundred thousand in Spain and Portugal—Three millions, six hundred thousand in Hungary—Twenty millions in Italy—Nine millions in Turkey in Europe—Ten millions in Great Britain and Ireland—Three millions in Switzerland—and seven millions in Venice, Genoa, and the islands in the Mediterranean sea, &c. how many inhabitants are there in Europe? — — *anf.* 158760000.

21. Divide 76 by $1\frac{1}{4}$ —— *anf.* 57.

22. Required the sum of 74615, 28843, 9964291, 7765, 328, 123456, 1008436, 7142642, 23596, 17486, 97, and 721486? —— —— *anf.* 28188971.

23. How many days are there in the twelve calendar months? *anf.* 365.

24. Express in figures, One hundred and thirty nine billions, two hundred thousand, and ninety five millions, seven thousand and eleven.

25. Divide 1735684 by $171\frac{3}{8}$ —— *anf.* $10127\frac{1}{2}\frac{3}{3}\frac{5}{7}\frac{5}{2}$.

REDUCTION.

REDUCTION teaches to bring numbers of one name, to others of a different name, retaining the ſame value.

RULE.—When the reduction is to a leſs name *multiply*, when to a greater *divide*, by as many of the leſs as make one of the greater. When a compound number is to be reduced to its loweſt denomination, begin at the higheſt, and bring it to the next leſs, and ſo on to the laſt; obſerving to add to each product thoſe numbers of the ſame name with itſelf which are in the given quantity. In reducing to a greater name, the remainders will always be of the ſame denomination as their dividends.

Of MONEY.

Farthings	Pence		
4	1	Shillings	
48	12	1	Pound
960	240	20	1

L. ſtands for pounds. | *D.* ſtands for pence.
Sh. ——— ſhillings. | *Qrs.* ——— farthings.

¼ ſtands for one farthing, or one fourth of any thing.
½ ——— two farthings, or one half of any thing.
¾ ——— three farthings, or three fourths of any thing.

	£.	Sh.		Sh.	D.
A guinea is —	1	1	A crown is —	5	0
A moidore —	1	7	A mark —	13	4
An angel —	0	10	A noble —	6	8

1. In 61 pounds, how many ſhillings, pence, and farthings?
anſ. 1220*s.* 14640*d.* 58560*qrs.*

2. In 58560 farthings, how many ſhillings, and pounds?
anſ. 1220*s.* 61*l.*

3. How many ſhillings and pence are there in 74 guineas?
anſ. 1554*s.* 18648*d.*

4. How many ſhillings and guineas are there in 18648*d.*?
anſ. 1554*s.* 74*g.*

5. In 20 pounds, how many crowns, ſhillings, ſixpences, and pence?
anſ. 80*cr.* 400*s.* 800*ſix.* 4800*d.*

6. In 51*l.* how many ſhillings, groats, pence, halfpence, ſixpences, threepences, and farthings?

anſ. 1020*s.* 3060*gr.* 12240*d.* 24480*halfp.* 2040*ſixp.* 4080*threep.* and 48960*qrs.*

7. In 25 moidores, how many ſhillings, pence, twopences, ſixpences, crowns, halfcrowns, threepences, and farthings?

anſ. 675*s.* 8100*d.* 4050*twop.* 1350*ſixp.* 135*cr.* 270*halfcr.* 2700*threep.* 32400*qrs.*

8. Bring 60 guineas to half-guineas, ſixpences, crowns, ſhillings, pence, twopences, groats, and farthings?

anſ. 120*halfg.* 2520*ſixp.* 252*cr.* 1260*s.* 15120*d.* 7560*twop.* 3780*gr.* and 60480*qrs.*

9. In 126*l.* how many half-crowns, ſixpences, half-guineas, quarter-guineas, threepences, pence, ſhillings, and guineas?

anſ. 1008*halfcr.* 5040*ſixp.* 240*half-g.* 480*quarter-g.* 10080*threep.* 30240*d.* 2520*s.* and 120*gu.*

10. In 252*l.* how many angels, ſhillings, groats, halfpence, farthings, threepences, half-crowns, crowns, pence, tenpences, and nobles? *anſ.* 504*ang.* 5040*s.* 15120*gro.* 120960*halfp.* 241920*qrs.* 20160*threep.* 2016*halfcr.* 1008*cr.* 60480*p.* 6048*tenp.* 756*ns.*

11. In 100*gu.* how many ſeven ſhilling pieces, ſhillings, ſixpences, three ſhillings and ſixpence pieces, threepences, farthings, twopences, groats, and halfpence? *anſ.* 300*ſeven-s.* 2100*s.* 4200*ſixp.* 600*three-s.* 8400*threep.* 100800*qrs.* 126000*twop.* 25200*gr.* and 504000*halfp.*

12. In 42*l.* 7*s.* how many ſhillings? *anſ.* 847.

13. Reduce 7*l.* 19*s.* to pence? *anſ.* 1908.

14. Reduce 14*l.* 13*s.* 7*d.* to pence? *anſ.* 3523.

15. In 14*l.* 17*s.* 8¼*d.* how many farthings? *anſ.* 14289.

16. In 14289*qrs* how many pence, ſhillings and pounds?

17. In 215*gu.* 17*s.* 4½*d.* how many halfpence? *anſ.* 11001.

18. 11001*halfp.* how many pence, ſhillings and guineas?

19. In 16*l.* 3*cr.* 2*s.* 4*d.* how many farthings? *anſ.* 16192.

20. Bring 16192 farthings to pence, ſhillings, crowns, and pounds?

TROY WEIGHT.

Grains	Pennyweights		
24	1	Ounces	
480	20	1	Pound
5760	240	12	1

Grs. ſtands for grains. | *Oz.* ſtands for ounces.
Dwts. —— pennyweights. | *Lib.* —— pounds.

Full weight Gold and Silver.	*dwt.*	*grs.*
A guinea ought to weigh	5	$9\frac{3}{5}(\frac{1}{2})$
A half guinea	2	$16\frac{4}{5}(\frac{1}{2})$
A Crown	19	$8\frac{16}{31}(\frac{1}{2})$
A ſhilling	3	$20\frac{28}{31}(21grs.)$

Note. A guinea muſt not weigh leſs than *5dwts. 8grs.*

Note. 22 carats of fine gold, and two carats of copper melted together is accounted the ſtandard for Gold. Alſo, *11oz. 2dwts.* of fine ſilver, and *18dwts.* of copper for ſtandard ſilver.

Gold is valued at about *4l.* an ounce, and ſilver at *5s.*

By this weight are weighed gold, ſilver, jewels, corn, and all kinds of liquors.

1. In *72lib.* how many ounces, pennyweights, and grains?
anſw. 864*oz.* 17280*dwts.* 414720*grs.*
2. Bring 414720 grains to dwts, oz. and lib.
3. In *7lib.* 10*oz.* 12*dwts.* 13*grs.* how many grains?
anſw. 45421.
4. In 45421 grains, how many pounds.
5. In 7 bars of ſilver, each weighing *4lb. 2oz. 13dwts.* how many dwts? *anſw.* 7091.

APOTHECARIES WEIGHT.

Grains	Scruples			
20	1	Drams		
60	3	1	Ounces	
480	24	8	1	Pound
5760	288	96	12	1

Grs ſtands for grains | *Dr.* ſtands for drams.
Scr. —— ſcruples. | *Lib.* —— pounds.

Note. By this weight the Apothecaries compound their medicines.

1. In *7lb. 2oz. 1dr. 2ſcr. 17grs.* how many grains?
anſw. 41397.
2. In 41397 grains, how many pounds?

6. In 51*l.* how many ſhillings, groats, pence, halfpence, ſixpences, threepences, and farthings?

anſ. 1020*s.* 3060*gr.* 12240*d.* 24480*halfp.* 2040*ſixp.* 4080*threep.* and 48960*qrs.*

7. In 25 moidores, how many ſhillings, pence, twopences, ſixpences, crowns, halfcrowns, threepences, and farthings?

anſ. 675*s.* 8100*d.* 4050*twop.* 1350*ſixp.* 135*cr.* 270*halfcr.* 2700*threep.* 32400*qrs.*

8. Bring 60 guineas to half-guineas, ſixpences, crowns, ſhillings, pence, twopences, groats, and farthings?

anſ. 120*halfg.* 2520*ſixp.* 252*cr.* 1260*s.* 15120*d.* 7560*twop.* 3780*gr.* and 60480*qrs.*

9. In 126*l.* how many half-crowns, ſixpences, half-guineas, quarter-guineas, threepences, pence, ſhillings, and guineas?

anſ. 1008*halfcr.* 5040*ſixp.* 240*half-g.* 480*quarter-g.* 10080 *threep.* 30240*d.* 2520*s.* and 120*gu.*

10. In 252*l.* how many angels, ſhillings, groats, halfpence, farthings, threepences, half-crowns, crowns, pence, tenpences, and nobles? *anſ.* 504*ang.* 5040*s.* 15120*gro.* 120960*halfp.* 241920*qrs.* 20160*threep.* 2016*halfcr.* 1008*cr.* 6048*op.* 6048 *tenp.* 756*no.*

11. In 100*gu.* how many ſeven ſhilling pieces, ſhillings, ſixpences, three ſhillings and ſixpence pieces, threepences, farthings, twopences, groats, and halfpence? *anſ.* 300*ſeven-s.* 2100*s.* 4200*ſixp.* 600*three-s.* 8400*threep.* 100800*qrs.* 126000*twop.* 63000*gr.* and 504000*halfp.*

12. In 42*l.* 7*s.* how many ſhillings? *anſ.* 847.

13. Reduce 7*l.* 19*s.* to pence? *anſ.* 1908.

14. Reduce 14*l.* 13*s.* 7*d.* to pence? *anſ.* 3523.

15 In 14*l.* 17*s.* 8¼*d.* how many farthings? *anſ.* 14289.

16. In 142899*qrs.* how many pence, ſhillings and pounds?

17. In 21*gu.* 17*s.* 4½*d.* how many halfpence? *anſ.* 11005.

18. 110018*halfp.* how many pence, ſhillings and guineas?

19. In 16*l.* 3*cr.* 2*s.* 4*d.* how many farthings? *anſ.* 16192.

20. Bring 16192 farthings to pence, ſhillings, crowns, and pounds?

TROY WEIGHT.

Grains	Pennyweights		
24	1.	Ounces	
480	20	1	Pound
5760	240	12	1

Grs. ſtands for grains.	*Oz.* ſtands for ounces.
Dwts. ——— pennyweights.	*Lib.* ——— pounds.

Full weight Gold and Silver.	*dwt.*	*grs.*
A guinea ought to weigh	5	$9\frac{12}{20}(\frac{1}{2})$
A half guinea	2	$16\frac{24}{20}(\frac{1}{2})$
A Crown	19	$8\frac{16}{11}(\frac{1}{2})$
A ſhilling	3	$20\frac{18}{11}(21grs.)$

Note. A guinea muſt not weigh leſs than 5*dwts.* 8*grs.*

Note. 22 carats of fine gold, and two carats of copper melted together is accounted the ſtandard for Gold. Alſo, 11*oz.* 2*dwts.* of fine ſilver, and 18*dwts.* of copper for ſtandard ſilver.

Gold is valued at about 4*l.* an ounce, and ſilver at 5*s.*

By this weight are weighed gold, ſilver, jewels, corn, and all kinds of liquors.

1. In 7*lib.* how many ounces, pennyweights, and grains?
anſw. 864*oz.* 17280*dwts.* 414720*grs.*
2. Bring 414720 grains to dwts, oz. and lib.
3. In 7*lib.* 10*oz.* 12*dwts.* 13*grs.* how many grains?
anſw. 45421.
4. In 45421 grains, how many pounds.
5. In 7 bars of ſilver, each weighing 4*lb.* 2*oz.* 13*dwts.* how many dwts?
anſw. 7091.

APOTHECARIES WEIGHT.

Grains	Scruples	Drams	Ounces	Pound
20	1			
60	3	1		
480	24	8	1	
5760	288	96	12	1

Grs ſtands for grains	*Dr.* ſtands for drams.
Scr. ——— ſcruples.	*Lib.* ——— pounds.

Note. By this weight the Apothecaries compound their medicines.

1. In 7*lb.* 2*oz.* 1*dr.* 2*ſcr.* 17*grs.* how many grains?
anſw. 41397.
2. In 41397 grains, how many pounds?

6. In 51*l.* how many ſhillings, groats, pence, halfpence, ſixpences, threepences, and farthings?

anſ. 1020*s.* 3060*gr.* 12240*d.* 24480*halfp.* 2040*ſixp.* 4080*threep.* and 48960*qrs.*

7. In 25 moidores, how many ſhillings, pence, twopences, ſixpences, crowns, halfcrowns, threepences, and farthings?

anſ. 675*s.* 8100*d.* 4050*twop.* 1350*ſixp.* 135*cr.* 270*halfcr.* 2700*threep.* 32400*qrs.*

8. Bring 60 guineas to half-guineas, ſixpences, crowns, ſhillings, pence, twopences, groats, and farthings?

anſ. 120*halfg.* 2520*ſixp.* 252*cr.* 1260*s.* 15120*d.* 7560*twop.* 3780*gr.* and 60480*qrs.*

9. In 126*l.* how many half-crowns, ſixpences, half-guineas, quarter-guineas, threepences, pence, ſhillings, and guineas?

anſ. 1008*halfcr.* 5040*ſixp.* 240*half-g.* 480*quarter-g.* 10080 *threep.* 30240*d.* 2520*s.* and 120*gu.*

10. In 252*l.* how many angels, ſhillings, groats, halfpence, farthings, threepences, half-crowns, crowns, pence, tenpences, and nobles? *anſ.* 504*ang.* 5040*s.* 15120*gro.* 120960*halfp.* 241920*qrs.* 20160*threep.* 2016*halfcr.* 1008*cr.* 60480*p.* 6048 *tenp.* 756*no.*

11. In 100*gu.* how many ſeven ſhilling pieces, ſhillings, ſixpences, three ſhillings and ſixpence pieces, threepences, farthings, twopences, groats, and halfpence? *anſ.* 300*ſeven-s.* 2100*s.* 4200*ſixp.* 600*three-s.* 8400*threep.* 100800*qrs.* 12600*twop.* 6300*gr.* and 50400*halfp.*

12. In 42*l.* 7*s.* how many ſhillings? *anſ.* 847.

13. Reduce 7*l.* 19*s.* to pence? *anſ.* 1908.

14. Reduce 14*l.* 13*s.* 7*d.* to pence? *anſ.* 3523.

15 In 14*l.* 17*s.* 8¼*d.* how many farthings? *anſ.* 14289.

16. In 14289*qrs.* how many pence, ſhillings and pounds?

17. In 21*gu.* 17*s.* 4½*d.* how many halfpence? *anſ.* 11001.

18. 11001*halfp.* how many pence, ſhillings and guineas?

19. In 16*l.* 3*cr.* 2*s.* 4*d.* how many farthings? *anſ.* 16192.

20. Bring 16192 farthings to pence, ſhillings, crowns, and pounds?

TROY WEIGHT.

Grains	Pennyweights		
24	1	Ounces	
480	20	1	Pound
5760	240	12	1

Grs. ſtands for grains. | *Oz.* ſtands for ounces.
Dwts. —— pennyweights. | *Lib.* —— pounds.

Full weight Gold and Silver.	*dwt.*	*grs.*
A guinea ought to weigh	5	$9\frac{3}{10}(\frac{1}{2})$
A half guinea	2	$16\frac{6}{10}(\frac{1}{4})$
A Crown	19	$8\frac{2}{11}(\frac{1}{2})$
A ſhilling	3	$20\frac{5}{11}(21 grs.)$

Note. A guinea muſt not weigh leſs than *5dwts. 8grs.*

Note. 22 carats of fine gold, and two carats of copper melted together is accounted the ſtandard for Gold. Alſo, *11oz. 2dwts.* of fine ſilver, and *18dwts.* of copper for ſtandard ſilver.

Gold is valued at about *4l.* an ounce, and ſilver at *5s.*

By this weight are weighed gold, ſilver, jewels, corn, and all kinds of liquors.

1. In *7lib.* how many ounces, pennyweights, and grains?
anſw. 864*oz.* 17280*dwts.* 414720*grs.*
2. Bring 414720 grains to dwts, oz. and lib.
3. In *7lib.* 10*oz.* 12*dwts.* 13*grs.* how many grains?
anſw. 45421.
4. In 45421 grains, how many pounds.
5. In 7 bars of ſilver, each weighing *4lb. 20oz. 13dwts.* how many dwts? *anſw.* 7091.

APOTHECARIES WEIGHT.

Grains	Scruples	Drams	Ounces	
20	1			
60	3	1		
480	24	8	1	Pound
5760	288	96	12	1

Grs ſtands for grains | *Dr.* ſtands for drams.
Scr. —— ſcruples. | *Lib.* —— pounds.

Note. By this weight the Apothecaries compound their medicines.

1. In *7lb. 10oz. 1dr. 2ſcr. 17grs.* how many grains?
anſw. 41397.
2. In 41397 grains, how many pounds?

AVOIRDUPOISE WEIGHT.

Drams	Ounces	Pounds	Quarters	Hundreds	Ton
16	1				
256	16	1			
7168	448	28	1		
28672	1792	112	4	1	
573440	35840	2240	80	20	1

Note. 14lb. make a ſtone in almoſt all places in England, but at London 8lb make a ſtone of butcher-meat. Cwt. ſtands for hundreds.

8 ſtones make a cwt.

19½ cwt. make a fodder, or fother

30 pounds of wool make a tod in Yorkſhire, and the other northern counties; but in Norfolk and the ſouthern counties only 28lb.

The pound avoirdupoiſe is equal to 14*oz.* 11*dwts.* 15½*grs.* troy.

The ounce avoirdupoiſe is equal to 18*dwts.* 5½*grs.* troy.

Bread, tea, coffee, ſoap, tar, &c. and all metals, except gold and ſilver, are weighed by this weight.

1. In 14*cwt.* 1*qr.* 17*lb.* 14*oz.* how many drams?
anſ. 413152.

2. Bring 413152 drams to ounces, pounds, quarters, and cwts.

3. In 6 hogſheads of tobacco, each weighing 13*cwts.* 2*qr.* 17*lb.* how many pounds? *anſ.* 9174.

4. In 19 barrels of raiſins, each weighing 2*cwt.* 3*qr.* 4*lib.* how many pounds? *anſ.* 5928.

5. How many pounds are there in 10 hogſheads of ſugar, each weighing 11*cwt.* 3*qr.* 21*lib.*? *anſ.* 13370.

CLOTH MEASURE.

Inches	Nails	Quarters	Yard
2¼	1		
9	4	1	
36	16	4	1

3qr. make 1 ell Flemiſh. | 6qrs. make 1 ell French.
5 ——— 1 ell Engliſh. | 4qrs. 1½ inch. 1 ell Scotch.

Inc. ſtands for inches.	*E. Fl.* ſtands for ell Flemiſh.
Na. ——— nails.	*E. Fr.* ——— ell French.
Yds. ——— yards.	*E. Sco.* ——— ell Scotch.
E. E. ——— ells Engliſh.	

Note. Scotch and Iriſh linens are meaſured by the yard;—Dutch linen by the ell Engliſh;—and tapeſtry by the ell Flemiſh.

1. In 72*yds.* 1*qr.* 1*na.* how many nails? *anſ.* 1157 *nails.*
2. In 670 ells Engliſh how many nails? *anſ.* 13400 *nails.*
3. In 16482 nails, how many quarters, and ells Flemiſh?
anſ. 1373 *El. Fle.* 1*qr.* 2*na.*
4. How many nails are there in 7 pieces of cloth, each meaſuring 17*yds.* 2*qrs.* 1*na.* *anſ.* 1967 *nails.*
5. In 4712 nails, how many yards, ells Engliſh, and ells Flemiſh? *anſ.* 294½ *yds.* 235½ *E. E.* 392½ *E. Fl.*

LONG MEASURE.

B. Corns	Inches	Feet	Yards	Poles	Fur.	M.	L.
3	1	Feet					
36	12	1	Yards				
108	36	3	1	Poles			
594	198	16½	5½	1	Fur.		
23760	7920	660	220	40	1	M.	
190080	63360	5280	1760	320	8	1	L.
570246	190080	15840	5280	960	24	3	1

Note. Geographers and ſeamen reckon 60 miles to a degree; but its true length has been found to be 69½ miles.

The circumference of the earth, being 360 degrees, is by geographers and ſeamen reckoned 21600 miles; but by the true circumference, it is 25020 miles.

4 Inches make a hand, 2 yards a fathom, and 1¼ foot a cubit.

80 chains make a mile; the chain being 22 yards long, is divided into a hundred equal parts called *links*, each link is 7 $\frac{92}{100}$ inches.

It is cuſtomary to allow 16½ feet to the pole in tens, and in foreſts 21 feet.

1. In 42707616 barleycorns, how many inches, feet, yards, poles, furlongs, and miles?
anſ. 224 *miles*, 5 *fur.* 18 *poles*, 1 *yd.* 2 *feet*, 8 *inc.*
2. In 224 miles, 5 furlongs, 18 poles, 1 yard, 2 feet, 8 inches, how many barleycorns?

3. In 19 miles, how many furlongs, poles, yards, and inches?
anſ. 152 *fur.* 6080 *poles,* 33440 *yds.* 1203840 *inc.*

4. Bring 1203840 inches to miles.

SQUARE MEASURE.

Sqr. Inches	S. feet	S. Yards	S. poles	Roods	Acre
144	1				
1296	9	1			
39204	272¼	30¼	1	Roods	
1568160	10890	1210	40	1	Acre
6272640	43560	4843	160	4	1

Note. Ten chains in length and one in breadth make an acre. 640 ſquare acres make a ſquare mile.

By this meaſure land, or any ſuperficies, is meaſured.

1. In 7 acres, 2 roods, 16 poles, 20 ſquare yards, how many ſquare feet? *anſ.* 331236 *ſquare feet.*

2. In 331236 ſquare feet, how many acres?

3. Suppoſe a field meaſure 14 acres, 2 roods, 8 poles, how many ſquare yards will there be in 20 fields of the ſame dimenſions? *anſ.* 1408440 *ſqr. yds.*

WINE MEASURE.

Pints	Quarts	Gal.	Tierces	Hhds	Pun.	Pipes	Tun
2	1						
8	4	1	Tierces				
336	168	42	1	Hhds			
504	252	63	1½	1	Pun.		
672	336	84	2	1⅓	1	Pipes	
1008	504	126	3	2	1½	1	Tun
2016	1008	252	6	4	3	2	1

1 tun of wine weighs 18*cwt.* and one gallon contains 231 cubic inches.

Qts. ſtands for quarts.
Gall. —— gallons.
Tir. —— tierces.
Hhds. —— hogſheads.
Pun. —— puncheons.

10 gallons make an anchor of Brandy or rum.
18 —— a runlet.
31½ —— a barrel.
236 —— a tun of ſweet oil.

8*lib.* is the ſtated weight of a gallon, but 7½ is commonly allowed as the weight.

Wines, brandies, rum, honey, oil, vinegar, &c. are meaſured by this meaſure.

1. In 17 puncheons, how many tierces, gallons, and quarts?
anſ. 34*tir.* 1428*gall.* 5712*qts.*

2. In 5712 quarts, how many gallons, tierces, and puncheons?

3. In 71 tuns, 2 hogſheads, 1 tierce, 19 gallons, how many pints?
anſ. 144632.

ALE *and* BEER MEASURE.

Pints	Quarts	Gallons	Firkins	Kild.	Barrel	Hhd
2	1					
8	4	1	Firkins			
68	34	8½	1	Kild.		
136	68	17	2	1	Barrel	
272	136	34	4	2	1	Hhd
408	204	51	6	3	1½	1

282 cubic inches are contained in one gallon of ale or beer.
At London 9 gallons make a firkin of beer, and 8 a firkin of ale.

Fir. ſtands for firkins.
Kild. —— kilderkins.
Bar. —— barrels.
B. bbd. ſtands for hogſhead of beer.
A. bbd. —— hogſhead of ale.

In Scotland.

4 gills make a mutchkin.
2 mutchkins a chopin.
2 chopins a pint.
2 pints make a quart.
4 quarts a gallon.
16 gallons a hogſhead.

The mutchkin is about ¾ of the Engliſh pint, two pints and a quarter of a gill Scotch being nearly equal to three Engliſh quarts.
The Scotch pint is 105 cubic inches.

3 Engliſh pints = 211$\frac{1}{64}$ cubic inches.
2 pints and ¼ gill Scotch = 211$\frac{41}{64}$ ——

1. In 141 barrels, how many firkins, gallons, and pints?
anſ. 564*fir.* 4794*gal.* 38352*pints.*

2. In 38352 pints, how many barrels?

3. In 14*bbds.* Scotch meaſure, how many gallons, pints, and mutchkins? *anſ.* 224*gal.* 1792*pints,* 7168*mutch.*

4. In 7168 mutchkins, how many pints, gallons, and hogſheads?

DRY MEASURE.

Pints	Quarts							
2	1	Gal.						
8	4	1	Pecks					
16	8	2	1	Bush.				
64	32	8	4	1	Combs			
256	128	32	16	4	1	Quar.		
512	256	64	32	8	2	1	Weys	
2560	1280	320	160	40	10	5	1	Laſt
5120	2560	640	320	80	20	10	2	1

The ſtandard buſhel is 18½ inches wide, and 8 inches deep.
The gallon, dry meaſure, contains 268⅘ cubic inches.

2 Buſhels a boll.
3 Buſhels a ſack.
36 Buſhels a chaldron of coals at London.
68 Buſhels a chaldron of coals at Newcaſtle, and and weighs 2tons. 13cwts.

A buſhel, water meaſure, is 5 pecks.—8 chaldrons a keel.

In Scotland.

4 Lippies, or forpats, make a peck.
4 Pecks a firlot.
4 Firlots a boll.
16 Bolls a chaldron.

The Scotch wheat firlot is nearly equal to the ſtandard Wincheſter buſhel, being in proportion as 100 is to 99.

By this meaſure, coals, corn, ſalt, ſeeds, fruits, oyſters, &c. are meaſured.

1. In 1468 buſhels, how many combs, quarters, and laſts? *anſ.* 18 *laſts*, 3 *qrs.* 1 *comb.*
2. In 18 laſts, 3 quarters, 1 comb, how many buſhels?
3. In 146 chaldrons of coals, London meaſure, how many buſhels and pecks? *anſ.* 5256 *buſh.* 26280 *pecks.*
4. In 176425 pecks of coals, Newcaſtle meaſure, how many chaldrons? *anſ.* 518 *chal.* 61 *buſh.*
5. In 174867 forpats, how many pecks, firlots, bolls, and chaldrons? *anſ.* 170 *chal.* 12 *bolls*, 1 *fir.* 0 *p.* 3 *for.*
6. In 170 *chal.* 12 *bolls*, 1 *fir.* 0 *p.* 3 *forp.* how many lippies? *anſ.* 174867.

OF TIME.

Seconds	Minutes	Hours	Days	Weeks	Month
60	1				
3600	60	1			
86400	1440	24	1		
604800	10080	168	7	1	
2419200	40320	672	28	4	1

Note. 12 Calendar months make a year, but 13 months, 1 day, and 6 hours, or 365 days, and 6 hours, make a Julian year, by which means, every fourth year has 366 days in it, and is called Leap year.

1. How many months, days, hours, minutes, and seconds are there in 1784 years? *anſ.* 23192 *mon.* 649376 *da.* 15585024 *ho.* 935101440 *min.* 56106086400 *ſec.*

2. In 7 *years*, 11 *months*, 17 *days*, how many hours. *anſ.* 68952 *hours.*

3. In 68952 hours how many days, months, and years?

The number of days in each calendar month may be known from the following verſes which are commonly put in books of this kind.

Thirty days hath September,
April, June, and November,
February hath twenty-eight alone,
And all the reſt have thirty-one,
Except Leap year, and then's the time,
When February's days are twenty-nine.

A Collection of uſeful Memorandums.

24 Sheets make 1 quire of paper.
20 Quires — ream ditto.
2 Reams — bundle.
10 Reams — bale.
60 Skins 1 roll of parchment or vellum.
10 Skins 1 dicker of hides.
12 Barrels 1 laſt of pot-aſhes, codfiſh, &c.
17 cwts. make 1 laſt of flax or feathers.
2400 lib. 1 laſt of gunpowder.
250 Gallons 1 tun of Greenland oil.
500 Bricks make 1 load.
1000 plain pantiles 1 ditto.
5 Lib. 1 ſtone of glaſs.
12 Dozen 1 groſs.
56 Lib. 1 firkin of butter.
64 Lib. 1 firkin of ſoap.
30 Lib. 1 barrel of anchovies.
100 Lib. 1 quintal of fiſh at Newfoundland.
24 Lib. 1 tod of wool.
100 Acres make 1 hide of land.
40 Solid feet of hewn timber 1 load.
50 —— unhewn —— 1 load.
32 Gallons 1 barrel of herring.

42 Gallons 1 barrel of ſalmon.	A Dutch mile—3¼ Engliſh miles.
1 cwt. 1 ditto of gunpowder.	— Italian — 1 1/12 —
20 ſtones 1 ſack of flour.	— Spaniſh league - 3 2/3 —
A French league is nearly 2¾ Engliſh miles.	— Ruſſian verſt - 3/4 —
— German mile—4 Engliſh miles.	— Toiſe — 6 3/7 feet.
	— Quintal — 100lbs.

When by the tables it cannot be found, how many of the leſs name make one of the greater.

Rule.—Bring the given quantity, and the integer to which it is to be brought, to the ſame name; then divide the greater number by the leſs, and the quotient will be the anſwer.

In 148 guineas, how many pounds ſterling? *anſ.* 155*l.* 8*s.*
In 155*l.* 8*s.* how many guineas? *anſ.* 148.
In 168 crowns how many half guineas? - *anſ.* 80.
Bring 504 half crowns to guineas. *anſ.* 60.
Bring 128 ells Engliſh to yards. - - *anſ.* 160.
In 785 ſhillings, how many half crowns? - *anſ.* 314.
In 555 ells Flemiſh, how many ells Engliſh? *anſ.* 333.
In 216 moidores, how many guineas? *anſ.* 277*gs.* 15*s.*
In 1008 nobles, how many half guineas? - *anſ.* 640.
In 810 angels, how many moidores? - *anſ.* 300.
In 864 marks, how many ſhillings? - *anſ.* 11520.
In 242 ſixpences, how many quarter guineas? *anſ.* 23*qr.g.* 3*d.*

A promiſcuous Collection of Queſtions to exerciſe

Reduction.

1. How many months, days, hours, minutes, and ſeconds have paſſed ſince the creation of the world, being 5784 years?

anſ. 75192 *mon.* 2105376 *days*, 50529024 *hours.* 3031741440 *min.* 181904486400 *ſec.*

2. In 147*l.* how many nobles, pence, ſixpences, three-pences, half crowns, crowns, angels, groats, two-pences, half-pence, and ſhillings? - - *anſ.* 441*nob.* 35280*d.* 5880*ſixp.* 11760*threep.* 1176 *half-cr.* 588*cr.* 294*ang.* 8820*gro.* 17640*two.* 70560 *halfp.* 2940*s.*

3. In 1000 tons of lead, how many fothers? *anſ.* 102 5/10

4. In 7 tons of wine, how many hogſheads, tierces, and gallons - - *anſ.* 28*hhds.* 42*tir.* 1764*gal.*

5. In 14607 quarts of wine, how many gallons, puncheons, and tons? - *anſ.* 14*tons*, 1 *pun.* 39 *gal.* 3*qts.*

6. How many buſhels are there in 142 chaldrons of coals, London meaſure? - - - *anſ.* 5112.

7. How often will a coach wheel, whoſe circumference is ſix yards, go round between Newcaſtle and Berwick, the diſtance being 64 miles? - - - *anſ.* 18773$\frac{2}{3}$.

8. How many ſpoons, each 2*oz.* 6*dwts.* can be made out of a large old ſilver veſſel weighing 5*lb.* 2*oz.* 2*dwts.* *anſ.* 27.

9. A contractor for a regiment of ſoldiers purchaſes 3000 yards of red cloth, of which he deſigns to make coats for the men; how many coats, each 2*yds.* 2*qrs.* can be made out of the 3000 yards? - - - *anſ.* 1200.

10. In 252*l.* how many ſixpences, three-ſhillings, nine-pences, pence, ſhillings, guineas, half-guineas, quarter-guineas, three-pences, half-pence, and farthings?

anſ. 10080*ſix p.* 1680*three-ſh.* 672*nine-p.* 60480*d.* 5040*s.* 240*gu.* 480*half-g.* 960*qr-g.* 20160*three-p.* 120960*half-p.* 241920*qrs.*

11. How many ſmall incloſures, each 8 acres, 2 roods, and 27 poles, can be made out of a common containing 260 acres, and 10 poles? - - - *anſ.* 30.

12. Bought 61 hogſheads of tobacco, each weighing 15*cwt.* 2*qr.* 8*lb.* how many pounds are in the whole? *anſ.* 106384.

13. An apothecary made ſix different compoſitions, each 2*lb.* 3*oz.* 2*dr.* how many ſcruples were in the whole? *anſ.* 3924.

14. How many buſhels are there in 67 laſts of wheat?

anſ. 5360.

15. A ſea captain bought 4 oxen at London, which, after they were dreſſed by the butcher, weighed 120 ſtones each; how many pieces, each 4$\frac{1}{4}$*lib.* can he have out of the ſame?

anſ. 808$\frac{8}{17}$.

16. A merchant bought 15 pieces of holland, each piece 100 ells Engliſh, how many quarters are contained in them?

anſ. 7500.

17. If one cheſt of tea weigh 1*cwt.* 2*qr.* how many ounces will there be in 12 cheſts, each containing the ſame quantity?

anſ. 32256.

18. How many fodders are there in 117 tons? *anſ.* 120.

19. In 100 hogſheads of brandy, how many anchors?

anſ. 630.

20. How many three-gill bottles can be filled out of 3 hogſheads of beer, London meaſure? - - *anſ.* 864.

21. In 174 Newcaſtle chaldrons of coals, how many buſhels? *anſ.* 11832.

22. How many gallons and pints are there in 3 tons of ſweet oil? - - - - *anſ.* 708*gal.* 5664*pints.*

23. A gentleman of fortune has a curious cabinet for holding money, which has 30 ſmall drawers in it, of equal dimenſions, each holding exactly 240 guineas, how many pounds ſterling can they hold? - - - - *anſ.* 7560*l.*

24. In 252 dollars, each 5*s.* 4*d.* how many guineas? *anſ.* 64.

25. How many quarter-guineas are in 39*l.* 12*s.* 9*d.* *anſ.* 151.

26. In 167 barrels of ale, London meaſure, how many gallons and quarts? - - - *anſ.* 5344*gal.* 21376*qts.*

27. In 174 French crowns, each 4*s.* 6*d.* how many pounds ſterling? - - - *anſ.* 39*l.* 3*s.*

28. In 504 half-crowns, how many pence, tenpences, crowns, ſixpences, half-guineas, guineas, ſhillings, threepences, quarter-guineas, three-halfpences, farthings, twopences, and half-pence?

anſ. 15120*d.* 1512*tenp.* 252*cr.* 2520*ſixp.* 120*half-g.* 60*g.* 1260*s.* 5040*threep.* 240*qr-g.* 10080*three-half-p.* 60480*qrs.* 7560*twop.* 30240*halfpence.*

29. How many miles, furlongs, yards, feet, and inches, is the earth round, when 69½ miles make a degree?

anſ. 2502*miles*, 20016*furl.* 4403520*yds.* 132105600*feet*, 1585267200*inches.*

30. How many ſeconds are contained in the month of June?

anſ. 2592000.

COMPOUND ADDITION.

COMPOUND Addition teaches to find the ſum of two or more compound Numbers.

RULE.—Place like names under each other; then begin at the loweſt, and find its ſum by Simple Addition, reduce this ſum to the next higher denomination, ſetting down the remainder and carrying the quotient; proceed in the ſame manner with all the denominations till you come to the higheſt, which do as in ſimple addition.

PENCE TABLE.

Pence.		s.	d.	Pence.		s.	d.
20	—	1	8	95	—	7	11
25	—	2	1	100	—	8	4
30	—	2	6	105	—	8	9
35	—	2	11	110	—	9	2
40	—	3	4	115	—	9	7
45	—	3	9	120	—	10	0
50	—	4	2	125	—	10	5
55	—	4	7	130	—	10	10
60	—	5	0	135	—	11	3
65	—	5	5	140	—	11	8
70	—	5	10	145	—	12	1
75	—	6	3	150	—	12	6
80	—	6	8	155	—	12	11
85	—	7	1	160	—	13	4
90	—	7	6				

Pence.		s.	Pence.		s.
24	—	2	108	—	9
36	—	3	120	—	10
48	—	4	132	—	11
60	—	5	144	—	12
72	—	6	156	—	13
84	—	7	168	—	14
96	—	8	180	—	15

£.	s.	d.
7	14	6¼
9	17	4¾
2	8	10½
4	15	6¼
2	9	4½
6	14	11¼
8	16	5¾
7	14	11½
9	12	8¼

£.	s.	d.
9	4	6¼
8	15	7½
7	17	4¾
6	5	7¾
1	12	8½
2	17	10¼
4	11	8½
6	4	7¼
8	18	8½

£.	s.	d.
6	19	4¾
4	12	11½
6	1	7¼
5	12	8½
6	11	6¾
2	9	4¼
6	14	9½
2	3	4¾
7	9	6½

£.	s.	d.
10	0	6¼
8	17	9
	14	7½
72	13	6¼
64	17	4½
6	16	—¼
79	—	4¾
62	15	9
4	17	8¼

£.	s.	d.
72	18	4¾
6	4	11½
41	14	2¼
67	12	10½
29	16	3¼
42	17	4¼
35	0	6
7	17	4¼
25	14	6½
46	12	11½
12	14	6½
4	—	7¼
22	14	6½
79	5	2¼
10	4	9½
89	12	11¾
65	15	9¼
27	12	8
67	12	9¼
14	14	4½
54	15	8¾
26	17	10½
33	13	3¾
17	12	4½
72	18	—
66	—	—
27	12	7¼
48	11	6½
26	4	7¾
7	—	10½
46	17	11
76	19	10¼
16	11	7¾
47	18	5½
64	17	4¼
67	12	4½
43	16	11¼
72	13	—

£.	s.	d.
67	2	10¾
33	15	9¼
25	14	10½
64	11	7
6	—	8¼
2	14	—
6	11	2¾
92	15	10¾
46	12	6½
14	17	4¾
8	7	—½
71	14	10¾
13	—	9½
6	12	7¾
44	17	4½
17	8	2¼
72	10	11½
65	4	7¾
21	—	—
67	9	8½
10	—	—
72	15	8¼
14	17	11¼
72	14	8½
7	16	5½
6	14	10½
3	17	6
2	5	11¾
9	13	4¾
7	9	3¼
2	11	9¾
6	—	10½
8	14	—
3	17	4¾
27	11	9¼
61	17	4¾
87	12	11½
34	16	8¾

£.	s.	d.
52	15	2¼
72	18	10¾
66	17	—
28	4	8¼
8	17	6½
2	14	10¼
25	16	4½
17	4	8½
61	11	3¼
20	13	4¼
48	17	10¼
43	18	9½
55	13	—
64	14	11¼
85	16	10¾
6	5	3¾
9	15	4¼
6	7	9
8	13	2¾
3	15	11½
6	4	3¾
2	16	11½
7	9	8¾
11	14	6½
6	5	—
3	15	3¾
72	4	7¼
66	15	—
20	4	10¼
6	—	7¾
18	13	11
7	14	8¾
76	17	10½
44	12	2
9	5	4½
10	11	6
7	4	8
4	16	7¼
8	12	8½

£.	s.	d.
6	5	7¾
10	18	11¾
8	14	3½
6	11	11¾
9	2	6¼
4	16	11¾
60	4	—
9	5	4
11	17	6
80	14	—
26	17	—
48	—	10
67	4	8¾
98	16	11¼
10	15	—
72	4	8¾
61	—	—
22	16	10¾
42	17	8½
14	13	—
6	14	8½
10	13	11¾
7	8	10½
4	3	9¾
6	9	4½
14	8	10¼
61	11	—
97	3	8¼
23	19	7½
16	12	6¼
9	—	10½
44	16	2¾
7	2	—
18	6	11¼
10	17	6½
8	18	5¼
15	15	7¼
14	2	5½
2	19	8¼

£.	s.	d.
11	16	2½
13	9	5¾
6	4	8¾
7	2	11¼
4	3	7½
75	14	6
66	18	2¼
52	13	7¾
8	16	6½
17	12	10
6	—	9
21	2	11½
96	15	4
9	19	7¾
42	4	10½
11	7	9¾
12	6	5¼
82	13	3¾
7	11	2¼
23	1	8½
14	4	3¼
18	16	3
16	5	8
2	17	6½
14	14	9½
8	17	—¼
17	14	8¼
32	16	7½
6	—	4½
7	19	10
39	14	7½
8	12	11¼
18	16	11¾

£.	s.	d.
66	14	6
24	14	10½
27	13	6¾
28	16	—¼
2	8	7¼
3	14	6¼
6	16	8½
1	15	10
2	14	3½
9	3	1¼
15	10	1½
12	3	5¼
15	1	8
17	15	3
84	11	3½
21	15	8¼
12	8	3½
6	—	7½
15	17	11¼
7	4	1
55	17	7¼
78	5	5¼
94	10	1¾
—	15	3½
1	10	7½
2	13	—½
2	19	4½
20	1	7¼
2	5	—¼
2	—	4¼
57	8	2½
48	6	3
12	2	10
2	12	4½

£.	s.	d.
—	16	3½
92	3	3½
94	12	6¾
4	12	4¾
9	—	7
9	15	10
21	5	7½
27	14	8¼
47	14	4¾
16	11	2½
87	16	10½
62	14	6¼
74	12	2½
48	3	1¼
6	14	6
4	7	9¼
20	17	—
18	18	9¾
67	14	2
41	16	4
8	19	10¾
49	16	2½
2	19	11¾
14	17	4¾
6	11	11¾
1	19	4¼
4	16	7
—	19	6¼
27	14	8
42	13	6½
7	12	6½
27	8	2¼
2	14	8¾

£.	s.	d.
44	12	2
23	18	6
16	11	6
12	4	4½
58	14	9
3	—	11½
3	15	7½
27	4	6
24	12	11¼
7	3	9½
47	2	11
16	12	9¾
11	18	0¾
81	14	9¾
7	10	11¼
—	17	5½
1	2	11½
—	12	10¾
4	5	3¾
6	17	6
15	6	11¼
24	1	10½
—	14	6¾
—	6	7
—	17	6
6	19	8
8	—	9
4	12	7¾
1	15	7½
7	2	6
8	8	7½

A merchant taking an inventory of his effects, finds he has in cash 500*l.* 19*s.* 10*d.* in broad cloth 714*l.* 9*s.* 6*d.* in scarlet 70*l.* in Shalloon 50*l.* 19*s.* 8*d.* in velveret 19*l.* 4*s.* 7*d.* in flannel 26*l.* 4*s.* in common yard-wide 614*l.* 13*s.* 2*d.* in buttons of sundry kinds 20*l.* in fusten, demity, &c. 12*l.* 19*s.* and a variety

of other articles, to the amount of 90*l.* 18*s.* 10*d.* now ſuppoſing he has 476*l.* 19*s.* 11*d.* of good debts, what is he worth?

anſ. 2597*l.* 8*s.* 6*d.*

A landlord of a tavern having a number of gentlemen to dine at his houſe, goes to the market and buys the following articles, viz. a ſirloin of beef 10*s.* 6½*d.* a flank 6*s.* 4½*d.* a neat's tongue 2*s.* 3½*d.* a ham 5*s.* 11¼*d.* eight couple of fowls 19*s.* 10½*d.* a leg of mutton 3*s.* 8¾*d.* an ear of veal 6*s.* 7¼*d.* bread 10*s.* 6¼*d.* garden ſtuff, and other ſmall articles to the value of 2*s.* 2½*d.* ſuppoſe they drink 18*s.* 8½*d.* of porter at dinner, and 4*l.* 19*s.* 6*d.* of wine after dinner; how much muſt the landlord charge them?

anſ. 9*l.* 6*s.* 4¼*d.*

A. B. ſchoolmaſter, is indebted to C. D. bookſeller, 12*s.* 10½*d.* for three dozen poſt paper copy-books,—12*s.* 6¾*d* for five Hutton's Guides—1*l.* 12*s.* 6*d.* for eight paper books—6*s.* 4*d.* for quills, 1*s.* 4½*d.* for ink—1*l.* 2*s.* 11*d.* for four Simpſon's Euclids—17*s.* 10*d.* for three Emmerſon's Algebras—10*s.* 9½*d.* for ſix dozen memorandum books—15*s.* 11½*d.* for ſix dozen copy-books—10*s.* 8*d.* for five complete letter-writers—and other articles to the amount of 4*s.* 6½*d.* what is the whole debt?

anſ. 7*l.* 8*s.* 4¾*d.*

A rider for a certain houſe at Mancheſter, having gone his journey, returns and gives in an account that he had received from A 50*l.* 17*s.* from B 120*l.* from C 9*l.* 17*s.* 6*d.* from D 20*l.* 14*s.* from E 15*l.* 19*s.* 4*d.* from F 40*l.* 19*s.* 11*d.* from G 95*l.* 6*s.* from H 13*l.* 17*s.* 4*d.* from I 73*l.* 17*s.* 4*d.* from K 200*l.* from L 6*l.* 7*s.* 4*d.* and from M 180*l.* how much did he receive in all?

anſ. 827*l.* 15*s.* 9*d.*

Of WEIGHTS and MEASURES.

Troy Weight.				*Apothecaries Weight.*					*Avoirdupoiſe Weight.*			
lib.	*oz.*	*dwts.*	*gr.*	*lib.*	*oz.*	*dr.*	*ſcr.*	*grs.*	*ton.*	*cwt.*	*qr.*	*lib.*
1'4	3	12	17	7	1	2	2	14	14	13	1	19
49	10	8	6	0	4	6	0	8	7	3	2	17
8	4	19	2	6	2	7	1	16	10	0	3	24
91	6	0	22	4	8	2	0	12	71	17	1	16
66	10	14	0	9	0	4	2	19	49	4	1	18
72	6	8	8	4	11	7	2	0	15	18	2	26
97	4	6	11	1	2	3	1	2	80	12	3	0
18	3	8	9	6	7	4	2	17	16	19	3	18
68	0	4	0	2	5	3	1	0	4	16	2	17
13	9	17	23	6	0	7	0	18	14	2	0	16

Cloth Measure.

yds.	qr.	na.
176	2	1
427	3	2
48	1	3
147	2	2
216	3	3
79	1	2
617	3	2
49	1	2
154	2	2
74	1	1
67	2	3

Cloth Measure.

el. e.	qr.	na.
714	4	2
615	2	1
853	3	3
61	2	1
125	4	3
96	3	2
174	3	2
827	4	3
623	1	2
61	2	2
482	4	1

Long Measure.

lea.	mi.	fur.	po.
10	2	3	14
27	1	7	34
94	1	6	8
18	0	3	17
42	2	1	18
9	0	1	21
71	2	2	10
41	1	3	7
14	2	0	37
87	2	4	16

Square Measure.

acr.	ro.	po.	yds.
12	1	17	14¼
27	2	14	7
69	1	24	17¾
72	3	18	8
13	1	16	12
8	1	37	6
10	2	14	7
17	1	16	10
88	2	25	25
14	2	18	17

Wine Measure.

hhd.	tir.	gall.	qts.
72	1	16	2
19	1½	27	1
45	½	23	2
66	1	19	2
17	½	11	1
43	¼	41	2
98	1¼	16	3
42	1	17	1
33	0	14	3
6	1	0	2

Ale and Beer M.

hhd.	fir.	gal.	pts.
7	4	7	3
6	5	4	4
9	3	2	5
4	2	6	1
9	4	2	3
6	3	7	6
1	2	3	4
7	5	7	1
9	4	6	2
3	2	3	6

Ale and Beer M.

b.	bbd.	kil.	gal.	qr.
42	2	16	2	
47	1	6	3	
27	1	15	1	
53	2	13	1	
75	1	8	2	
67	2	10	3	
14	2	6	2	
18	1	14	1	
71	2	16	3	
4	1	10	1	
63	2	7	3	

Dry Measure.

last.	qr.	buf.	gal.
9	6	4	3
4	3	2	6
19	9	7	7
40	0	3	4
97	1	0	6
10	4	2	7
9	6	1	4
27	3	4	1
6	2	6	0
7	5	4	6

Of Time.

yrs.	mo.	da.	ho.
14	4	7	13
19	12	14	19
72	0	16	8
41	6	4	9
87	9	7	6
17	11	27	23
61	4	2	4
16	7	1	0
43	12	13	6
67	4	8	2

13. Suppose a wine-merchant in one year imported 7*tuns.* 2*hhds.* 19*gal.* of red port; 10*tun.* 48*gal.* of Malaga; 2*tun.* 3*hhds.* 19*gal.* of Burgundy; 1*tun.* 2*hhds.* 16*gal.* of Canary; 4*tun.* of claret; 2*tun.* 3*hhds.* of champaign, and 5*tun.* 2*hhds.* 14*gal.* of Lisbon; how much did he import?

anf. 34*tun.* 1*hhd.* 53*gal.*

14. A linen-draper commissioned seven pieces of cloth from Ireland; the first contained 72*yds.* 1*qr.* 2*na.* the second 20*yds.* 3*qr.* the third 100*yds.* the fourth 35*yds.* 3*na.* the fifth 46*yds.* 2*qr.* the sixth 71*yds.* 2*qr.* 1*na.* and the seventh 46*yds.* 1*qr.* 2*na.* how many yards did he commission? *anf.* 392*yds.* 3*qr.*

15. A corn-merchant ordered his factor to buy 4*lasts*, 2*qr.* 7*bush.* of wheat, 9*qr.* 7*bush.* of oats, 7*lasts*, 2*qr.* 6*bush.* of barley, 4*qr.* of rye, 2*qr.* 3*bush.* of peas, and 2*qr.* 1*bush.* of beans; how much did he purchase? *anf.* 13*lasts*, 4*qr.*

16. A merchant bought eight bags of hops, No. 1. weighed 3*cwt.* 1*qr.* 4*lb.* No. 2. 1*cwt.* 3*qr.* 27*lb.* No. 3. 4*cwt.* No. 4. 3*cwt.* 1*qr.* 14*lb.* No. 5. 2*cwt.* 2*qr.* 17*lb.* and each of the other three weighed 2*cwt.* 2*qr.* 19*lb.* how many *cwt.* did he buy.

anf. 23*cwt.* 1*qr.* 7*lb.*

COMPOUND SUBTRACTION.

COMPOUND Subtraction teaches to find the difference between two numbers, one or both consisting of several denominations.

RULE.—Set the less number under the greater, in such order that like denominations may be directly below each other; then begin at the right, and take the under number of each denomination from the upper, setting down the difference; but when the under number is greater than the upper, borrow as many of its name as make one of the next higher, from which take the under, and to the difference add the upper, placing down the sum; remembering always when you borrow in any denomination, to carry one to the next: proceed in the same manner through all the denominations till you come to the highest, which do by Simple Subtraction.

l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
127	14	$8\frac{1}{4}$	47	13	$4\frac{3}{4}$	87	16	$10\frac{1}{2}$	74	12	$2\frac{1}{4}$
86	13	$6\frac{1}{4}$	16	11	$2\frac{1}{2}$	62	14	$6\frac{1}{4}$	48	3	$1\frac{1}{4}$

l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.
67	14	7¼	47	11	4½	126	10	4¾	79	18	4½
42	13	6½	14	8	7¾	47	14	2½	49	19	6¾

l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.
127	14	8	4	16	0¼	10	13	0	29	0	7¼
0	19	6¼	1	19	4¼	6	11	11¾	14	17	4¾

l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.
67	14	2	16	17	0	50	0	0	3	0	0
41	16	4	8	19	10¾	49	16	2½	2	19	11¾

l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.
6	14	6	20	17	0	100	0	0	4	0	6
4	7	9¼	18	18	0¾	77	0	0½	3	0	9½

l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.
2	0	0	4	0	0	6	0	0¼	67	1	0
0	0	10¾	0	1	0½	4	0	0¾	48	19	0½

Subtract ¼*d.* from 20*l.* - *anf.* 19*l.* 19*s.* 11¾*d.*

What is the difference between 10*l.* 16*s.* and 7*l.* 19*s.* 9*d.* *anf.* 2*l.* 16*s.* 3*d.*

What is the difference between 7½*d.* and 1*l.* *anf.* 19*s.* 4½*d.*

Borrowed 20*l.* of which I have paid 14*l.* 19*s.* 8¾*d.* how much remains to pay? - - - *anf.* 5*l.* 3¼*d.*

Bought goods for 15*l.* 18*s.* and ſold them for 20*l.* 17*s.* how much was gained? - - *anf.* 4*l.* 19*s.*

Note. When a perſon borrows a ſum of money, and endeavours to diſcharge the ſame at different payments; add the ſeveral payments together, and ſubtract the ſum from the money borrowed, the difference will be what remains unpaid.

	l.	*s.*	*d.*
Borrowed	100	0	0
Paid at	16	4	7
ſundry	20	6	3
times	4	6	7
Paid in all			
Remains unp.			

	l.	*s.*	*d.*
Borrowed	17	16	4
Paid at	4	6	2
ſundry	1	4	3
times	10	2	7
Paid in all			
Remains unp.			

A borrowed of B 674*l.* of which he has paid him again at one time 72*l.* 4*s.* 9*d.* at another time 20*l.* at another 7*l.* 16*s.* 8*d.* at another 12*l.* 19*s.* at another 50*l.* 5*s.* at another 200*l.* 17*s.* 10*d.* and at another 116*l.* 5*s.* 10*d.* how much remains to pay? *anſ.* 193*l.* 10*s.* 11*d.*

Suppoſe I borrow of my friend 100*l.* and that I have paid him at one time 20*l.* at another time 10 guineas, at another 17*l.* 14*s.* 9*d.* and at another 40*l.* 19*s.* how much have I paid in all, and how much am I ſtill in debt?

anſ. Paid 89*l.* 3*s.* 9*d.* *In debt* 10*l.* 16*s.* 3*d.*

Of WEIGHTS *and* MEASURES.

yds.	*qr.*	*na.*
72	2	0
67	3	3

cwt.	*qr.*	*lib.*
19	0	19
7	1	22

lib.	*oz.*	*dra.*
72	4	13
31	14	15

lib.	*oz.*	*dra.*	*ſcr.*
4	2	0	0
1	4	0	2

mi.	*fur.*	*po.*
37	0	17
16	0	19

yds.	*feet*	*inc.*
172	2	11
42	1	11

a.	*bbd.*	*fir.*	*gal.*
72		3	6
43		3	7

acr.	*ro.*	*po.*
171	2	0
98	3	17

yds.	*feet*	*inch.*
74	6	114
68	7	120

h.	*hhd.*	*hil.*	*gal.*
14	2		14
8	2		17

laſts	*qr.*	*buſh.*
71	2	6
49	4	7

tun.	*hhd.*	*gal.*
72	0	17
49	3	60

hhd.	*tir.*	*gal.*	*yea.*	*mon.*	*da.*	*lb.*	*oz.*	*dwt.*	*gr.*	*hhd.*	*kil.*	*gal.*
108	1	17	71	2	19	14	1	13	14	7	1	14
79	0	18	69	12	21	6	8	17	16	6	1	16

COMPOUND MULTIPLICATION.

COMPOUND Multiplication teaches how to increase a compound number, as many times as there are units in a simple number.

By this rule the value of any whole number less than 157 is readily found, when the price of 1, of the same denomination, is known.

CASE 1.

When the multiplier is less than thirteen.

RULE.—Set the multiplier under the lowest name of the multiplicand, and multiply each denomination in it by the multiplier, placing down and carrying as in compound addition.

	s.	*d.*
Mul.	12	6
by		3

	s.	*d.*
Mul.	8	2
by		4

	s.	*d.*
Mul.	14	8
by		5

	s.	*d.*	
Mul.	2	8	by 6

	d.	
Mul.	7¼	by 7

	l.	*s.*	*d.*	
Mul.	20	1	2	by 8

9*lib.* of tea, at 7*s.* 9*d.*	-	*anf.* 3*l.* 9*s.* 9*d.*
10*yds.* of cloth, at 4*s.* 9½*d.*	-	2*l.* 7*s.* 11*d.*
11*lib.* of sugar, at 9¾*d.*	-	8*s.* 11¼*d.*
12*lib.* of beef, at 4½*d.*	-	4*s.* 6*d.*

CASE 2.

When the multiplier is greater than thirteen, and can be found in the multiplication table.

RULE—Find the component parts of the multiplier; and multiply by one of them, as in case first, and that product again by the other, will give the answer.

		s.	d.		£.	s.	d.
1.	14 Yards of cloth, at	2	9	*anſ.*	1	18	6
2.	15 Penknives -	1	4½	—	1	—	7½
3.	16 Handkerchiefs -	7	6	—	6	—	—
4.	18 Gallons of wine	8	9	—	7	17	6
5.	20 Dollars -	4	9	—	4	15	—
6.	21 Quires of paper	1	2½	—	1	5	4½
7.	22 Ells of diaper	1	3½	—	1	8	5
8.	24 Pairs of ſpectacles	5	7	—	6	14	—
9.	25 Buſhels of oats	2	9	—	3	8	9
10.	27 Oz. of bark	—	9¼	—	1	—	9¾
11.	28 Arithmetics -	2	3½	—	3	4	2
12.	30 Pairs of ſhoes -	5	10	—	8	15	—
13.	32 Buſhels of wheat	6	1	—	9	14	8
14.	33 Days work -	3	7	—	5	18	3
15.	35 Yards of linen	2	7¼	—	4	11	1¾
16.	36 Gal. of brandy	11	8	—	21	—	—
17.	40 Yards of ribband	—	4½	—	—	15	—
18.	42*lb.* of pepper -	2	3¾	—	4	17	1½
19.	44 Pairs of ſtockings	3	6	—	7	14	—
20.	45 Yards of lawn -	9	10½	—	22	4	4½
21.	48 Oz. of rhubarb	1	4½	—	3	6	—
22.	49 Cocoa nuts -	1	8¾	—	4	4	8¾
23.	50 Yds. Iriſh linen	4	9	—	11	17	6
24.	54 Maps -	7	6	—	20	5	—
25.	56*cwt.* of ſugar 4	18	—	—	274	8	—
26.	60 Norwich ſhawls 1	17	9	—	113	5	—
27.	63*yds* Perſian ſilk	4	11	—	15	9	9
28.	64 Barrels of ale 1	9	7	—	94	13	4
29.	66 Grammars -	1	3½	—	4	5	3
30.	70*lb.* of tea -	18	6	—	64	15	—
31.	72 Acres - 2	14	6	—	196	4	—
32.	77 Gal. beer -	1	2½	—	4	13	—½
33.	80 Quarts rum	2	4¾	—	9	11	8
34.	84 Hats -	12	9	—	53	11	—
35.	88*lb.* of cloves	17	4½	—	76	9	—
36.	90 Bottles of wine	2	2	—	9	15	—
37.	96 Yards ſilk -	4	9	—	22	16	—
38.	100 Watches - 4	19	6	—	497	10	—
39.	108 Deals -	1	10	—	9	18	—
40.	110 Firkins butter 1	15	10	—	197	1	8
41.	120*cwt.* Tobacco 6	14	9	—	808	10	—

		£.	s.	d.		£.	s.	d.
42.	121 Ewes	1	2	9	—	137	12	9
43.	132 Stones of beef		3	7½	—	23	18	6
44.	144 Eggs			1¼	—	—	15	—

CASE 3.

When the multiplier is less than 157, and is not in the multiplication table.

RULE.—Find the nearest number to it in the multiplication table; with which do as in the last case; then multiply the head line by as many as it is greater or less than the given number, which add to the last product when less, but subtract when greater; and the sum, or difference will be the answer.

	s.	d.	£.	s.	d.		s.	d.	£.	s.	d.
17 at	19	6	16	11	6	68	4	9	16	3	—
19	5	6	5	4	6	69	—	10½	3	—	4½
23	10	7½	12	4	4½	71	16	2	57	7	10
26	5	9	7	9	6	73	8	1¼	29	11	7¼
29	2	2½	3	4	—½	74	7	11½	29	8	11
31	1	6½	2	7	9½	75	15	1½	56	14	4½
34	5	7¾	9	11	11½	76	7	11¼	30	3	3
37	11	9	21	14	9	78	13	9	53	12	6
38	—	9¼	1	9	3½	79	1	7¼	6	6	8¾
39	1	2	2	5	6	82	5	1½	21	—	3
41	10	—½	20	11	8½	83	13	7	56	7	5
43	8	10	18	19	10	85	16	8	70	16	8
46	17	5	40	1	2	86	6	7	28	6	2
47	5	9	13	10	3	87	7	4	31	18	—
51	2	10	7	4	6	89	11	8½	52	2	—½
52	7	6½	19	12	2	91	—	7¼	2	14	11¼
57	14	6	41	6	6	92	9	5¼	43	8	3
58	9	8¼	28	1	10½	93	5	11	27	10	3
59	5	3	15	9	9	94	2	9¾	13	4	4½
61	—	11¼	2	19	8¾	95	8	10½	42	3	1½
62	—	10¼	2	12	11½	97	19	7	94	19	7
65	4	7½	15	—	7½	98	17	6	85	15	—
67	17	3¼	57	17	1¾	101	8	11	45	—	7

	£.	s.	d.		£.	s.	d.
102 at	—	—	2¾		1	3	4½
103	3	17	4		398	5	4
104	1	14	—		176	16	—
105	1	11	5½		165	3	1½
106	2	14	9		290	3	6
107	—	13	4¾		71	13	4¼
109	7	8	7		809	15	7
111	6	2	3		678	9	9
112	—	19	11		111	10	8
113	9	2	6		1031	2	6
114	—	11	11½		68	3	3
115	—	2	9¼		15	18	7¾
116	7	15	9		903	7	—
117	1	17	8		220	7	—
118	4	1	2½		479	2	7
119	3	18	1		464	11	11
122	2	13	7¼		326	19	8½
123	3	7	11¼		417	16	3¾
124	9	19	10		1238	19	4
125	6	17	4		858	6	8
126	1	7	9¾		175	4	4½
127	1	11	7		200	11	1
128	—	1	8½		10	18	8
129	—	14	10¼		95	16	2¼
130	—	4	4¾		28	11	5½
131	27	1	9		3548	9	3
133	8	17	6		1180	7	6
134	2	19	3		396	19	6
135	16	1	1		2167	6	3
136	2	17	4¾		390	5	10
137	4	12	6		633	12	6
138	31	7	6½		4330	—	9
139	8	3	3		1134	11	9
140	1	11	8½		221	19	2
141	15	15	7		2224	17	3
142	—	7	10¼		55	15	3½
143	2	14	4		388	9	8
145	13	6	7½		1933	—	7½
146	40	7	8		5895	19	4
147	2	2	9		314	4	3
148	15	18	6		2356	18	—
149	17	4	6½		2566	16	8½

	£.	s.	d.		£.	s.	d.
150	21	3	1½	———	3173	8	9
151	6	18	7	———	1046	6	1
152	43	7	6	———	6593	—	—
153	—	11	6¼	———	88	5	10½
154	—	—	4¾	———	3	—	11½

Of WEIGHTS *and* MEASURES.

7lb. 10*oz.* 13*dwts.* 4*grs.* by 4. *anf.* 31*lb.* 6*oz.* 12*dwt.* 16*gr.*

17*ton.* 14*cwt.* 2*qr.* 19*lb.* by 6. *anf.* 106*ton.* 8*cwt.* 0*qr.* 2*lb.*

3*cwt.* 1*qr.* 17*lb.* by 8. - *anf.* 27*cwt.* 0*qr.* 24*lb.*

17*yds.* 2*qrs.* 3*na.* by 9. - *anf.* 159*yds.* 0*qr.* 3*na.*

7*tun.* 2*hhds.* 14*gal.* by 11. - *anf.* 83*tun.* 0*hhd.* 28*gal.*

14*acr.* 1*ro.* 19*poles* by 12. - *anf.* 172*acr.* 1*ro.* 28*poles.*

7*cwt.* 2*qr.* 4*lb.* by 16. - *anf.* 120*cwt.* 2*qr.* 8*lb.*

How many *cwt.* are there in 18 pieces of lead, each 10*cwt.* 2*qr.* 17*lb.* - - *anf.* 191*cwt.* 2*qr.* 26*lb.*

How many yards are there in 24 pieces of linen, each piece meaſuring 14*yds.* 2*qr.* 2*na.* - - *anf.* 351*yds.*

If one hogſhead of tobacco weigh 14*cwt.* 0*qr.* 17*lb.* how much will 29 weigh? - - *anf.* 410*cwt.* 1*qr.* 17*lb.*

How many gallons are there in 33 caſks of beer, each 14*gal.* 2*qt.* 1*pint*? - - *anf.* 481*gal.* 2*qt.* 1*pint.*

How many gallons are there in 47 half-anchors, each 7*gal.* 1*pint*? - - *anf.* 334*gal.* 3*qt.* 1*pint.*

COMPOUND DIVISION.

COMPOUND Diviſion teaches how to divide either a compound or ſimple number, into any propoſed number of equal parts, each of which ſhall conſiſt of ſundry denominations.

CASE 1.

When the diviſor is leſs than thirteen.

RULE.—Divide each denomination in the dividend as in caſe firſt ſimple diviſion, placing the quotients under their proper dividends; when any thing remains, reduce it to the next inferior name, adding thereto what is in the dividend of that denomination, divide this number as before; Proceed in the ſame manner through all the denominations.

	£.	s.	d.			£.	s.	d.	
Divide	6	18	9½	by 3	Divide	19	10	10	by 8
———	20	16	8	4	———	20	4	7½	9
———	25	15	8¾	5	———	64	5	—	10
———	38	17	6	6	———	4	13	—½	11
———	17	4	5½	7	———	53	11	—	12

CASE 2.

When the diviſor is more than thirteen, and can be found in the multiplication table.

RULE.—Find the component parts of the diviſor, and divide by one of them, as in caſe firſt, and that quotient again by the other will give the anſwer.

Divide 1*l.* 6*s.* 10*d.* by 14. - *anſ.* 1*s.* 11*d.*

Divide 6*l.* 2*s.* 8*d.* by 16. - - *anſ.* 7*s.* 8*d.*

Divide 6*l.* 6*s.* 8*d.* by 20. - - *anſ.* 6*s.* 4*d.*

Divide 72*l.* 4*s.* 6*d.* by 24. - *anſ.* 3*l.* 0*s.* 2¼*d.*

If 30 yards of cloth coſt 3*l.* 15*s.* 7½*d.* what was that a yard? *anſ.* 2*s.* 6¼*d.*

Sold 36 pounds of tea for 27*l.* 4*s.* 6*d.* what was that a pound? *anſ.* 15*s.* 1½*d.*

What coſt 1 yard of linen, when 42 yards coſt 6*l.* 9*s.* 6*d.* *anſ.* 3*s.* 1*d.*

Divide 25*l.* 10*s.* 5*d.* equally among 50 perſons. *anſ.* 10*s.* 2½*d.*

Bought 54 ſtones of beef, for 10*l.* 11*s.* 6*d.* how much does it coſt a ſtone? *anſ.* 3*s.* 11*d.*

Bought a firkin of butter, containing 56*lib.* for 1*l.* 15*s.* what did it coſt a pound? *anſ.* 7½*d.*

If 60 eggs coſt 6*s.* 3*d.* what was that a piece? *anſ.* 1¼*d.*

If 63 pair of ſhoes coſt 18*l.* 12*s.* 9*d.* what coſt 1 pair? *anſ.* 5*s.* 11*d.*

If 66 chaldrons of coals coſt 55*l.* 5*s.* 6*d.* what was that for 1 chaldron? *anſ.* 16*s.* 9*d.*

Bought 72 buſhels of wheat, for 23*l.* 14*s.* what did it coſt a buſhel? *anſ.* 6*s.* 7*d.*

If a puncheon of rum coſt 52*l.* 17*s.* what is that a gallon? *anſ.* 12*s.* 7*d.*

A ſilver-ſmith bought an ingot of ſilver, which weighed 99 ounces, for 24*l.* 12*s.* 11¼*d.* how much did it coſt per ounce? *anſ.* 4*s.* 11½*d.*

Divide 115*l.* 16*s.* 8*d.* by 100 - *anſ.* 1*l.* 3*s.* 2*d.*

Divide 42*l.* 6*s.* by 108 - - *anſ.* 7*s.* 10*d.*

Divide 601*l.* by 120 - - *anſ.* 5*l.* 0*s.* 2*d.*
Divide 40*l.* 14*s.* by 132 - *anſ.* 6*s.* 2*d.*

CASE 3.

When the diviſor cannot be found in the multiplication table.

RULE.—Divide by caſe third ſimple diviſion, obſerving the latter part of the rule for caſe firſt compound diviſion.

Divide 6*l.* 10*s.* 7½*d.* by 19 - - *anſ.* 6*s.* 10½*d.*
Divide 43*l.* 14*s.* 10*d.* by 29 - *anſ.* 1*l.* 10. 2*d.*
Divide 30*l.* 0*s.* 8*d.* by 34 - - *anſ.* 17*s.* 8*d.*
Divide 502*l.* 18*s.* by 47 - - *anſ.* 10*l.* 14*s.*
Divide 18*l.* 7*s.* 8¼*d.* by 53 - *anſ.* 6*s.* 11¼*d.*
Divide 38*l.* 10*s.* 6*d.* by 67 - *anſ.* 11*s.* 6*d.*

What is cloth per yard, when 78 yards coſt 18*l.* 10*s.* 6*d.* *anſ.* 4*s.* 9*d.*

Bought 87 quarters of barley for 202*l.* 5*s.* 6*d.* what was that per quarter? - - - *anſ.* 2*l.* 6*s.* 6*d.*

Divide a prize of 201*l.* 9*s.* equally among 98 ſailors. *anſ.* 20*l.* 10*s.* 6*d.*

If a perſon ſpend 70*l.* 4*s.* in two years, how much is that per week? - - - - *anſ.* 13*s.* 6*d.*

Bought a pipe of ſtrong beer, which contained 119 gallons, for 7*l.* 3*s.* 9½*d.* what did it coſt per gallon? *anſ.* 1*s.* 2½*d.*

If the clothing of 3 companies of ſoldiers, containing 274 men, coſt 308*l.* 5*s*, what was that, at an average, for each man? *anſ.* 1*l.* 2*s.* 6*d.*

Suppoſe a perſon ſpend 47*l.* 2*s.* 11*d.* in a year, how much is that per day? - - *anſ.* 2*s.* 7*d.*

Of WEIGHTS *and* MEASURES.

5*cwt.* 1*qr.* 27*lb.* by 3	*anſ.*	1*cwt.* 3*qr.* 9*lb.*
26*lb.* 12*oz.* 12*dr.* by 4	—	6*lb.* 11*oz.* 3*dr.*
21*ton.* 12*cwt.* 2*qr.* by 5	—	4*ton.* 6*cwt.* 2*qr.*
7*lb.* 9*oz.* 1*dwt.* 6*gr.* by 6	—	1*lb.* 3*oz.* 10*dwt.* 5*gr.*
51*oz.* 1*dr.* 0*ſcr.* 16*gr.* by 7	—	7*oz.* 2*dr.* 1*ſcr.* 8*gr.*
29*yds.* 2*qr.* by 8	—	3*yds.* 2*qr.* 3*na.*
62*yds.* 0*feet.* 9*inc.* by 9	—	6*yds.* 2*feet.* 9*inc.*
35*tun.* 1*hhd.* 37*gal.* by 10	—	3*tun.* 2*hhd.* 10*gal.*
82*days.* 20*hours.* 15*min.* by 11	—	7*days.* 12*ho.* 45*min.*
21*acres.* 3*roods.* by 12	—	1*acr.* 3*ro.* 10 *pol.*

21*cwt.* 3*qr.* by 14	*anſ.*	1*cwt.* 2*qr.* 6*lb.*
30*ells E.* 2*qr.* by 16	—	1*ell E.* 4*qr.* 2*na.*
13*cwt.* 3*qr.* 20*lb.* by 24	—	2*qr.* 9*lb.*
173*acr.* 3*ro.* 10*po.* by 30	—	5*acr.* 3*ro.* 7*po.*
435*cwt.* 0*qr.* 24*lb.* by 36	—	12*cwt.* 0*qr.* 10*lb.*
878*ells Fle.* 1*qr* 2*na.* by 42	—	20*ells Fle.* 2*qr.* 3*lb.*
11*cwt.* 2*qr.* 18½*lb.* by 26	—	1*qr.* 22¾*lb.*
39*cwt.* 1*qr.* 14*lb.* by 168	—	26¼*lb.*

As it often happens in buſineſs that there is either a ¼, ½, or ¾ in the quantity, to find the value of ſuch this is the

RULE.—After having found the value of the whole number by compound multiplication, divide the head line, or price of 1, by 4 for ¼, by 2 for ½, and for ¾ divide the head line firſt by 2 for ½, and that quotient again by 2 for ¼, theſe added to the value of the whole number will give the anſwer.

		l.	*s.*	*d.*		*l.*	*s.*	*d.*
19¼	at	—	—	4¼	*anſw.*	—	6	9¾
4½		—	16	9		3	15	4½
67¾		—	4	3		14	7	11¼
7¼		—	3	2		1	2	1½
16½		—	—	6¼		—	8	7
46¾		3	17	9		181	14	9½
35½		4	15	6		169	10	3
56¾		2	18	7		166	4	7¼
211¼		—	12	6		73	5	7½
36½		3	6	6		121	7	3
72¾		1	12	10		119	8	7½
16¼		1	16	6½		29	13	9½

When there is any fraction in the quantity.

RULE.—The value of the whole number being found, multiply the head line by the numerator, and divide the product by the denominator; the quotient added to the value of the whole number, will give the anſwer.

What comes 17⅞*lib.* to, at 8*s.* 9*d.*	*anſ.* 7*l.* 10*s.* 11½*d.*
19½*lib.* of butter, at 10½*d.*	*anſ.* 17*s.* 8½*d.*
6⅝*lib.* of beef, at 4½*d.*	*anſ.* 2*s.* 8*d.*
14¾*lb.* of ſugar, at 10½*d.*	*anſ.* 12*s.* 10¼*d.*

$7\frac{1}{4}$ yards of linen, at 3*s.* 2*d.* - - *anſ.* 1*l.* 2*s.* $11\frac{1}{2}$*d.*
$34\frac{1}{2}$ ells, at 6*s.* $10\frac{1}{2}$*d.* - - *anſ.* 11*l.* 18*s.* $10\frac{1}{2}$*d.*
$5\frac{1}{2}$ ſtones of ſoap, at 4*s.* $2\frac{1}{2}$*d.* - - *anſ.* 1*l.* 4*s.* $2\frac{1}{2}$*d.*
$18\frac{1}{4}$ yards, at 17*s.* 9*d.* - - *anſ.* 16*l.* 12*s.* $9\frac{1}{2}$*d.*
$4\frac{7}{8}$ yards of cloth, at 17*s.* 6*d.* - *anſ.* 4*l.* 5*s.* $3\frac{3}{4}$*d.*
$46\frac{1}{3}$ yards, at 6*s.* 7*d.* - - *anſ.* 15*l.* 6*s.* $11\frac{1}{4}$*d.*
$15\frac{3}{5}$ ſtones, at 14*s.* $6\frac{1}{2}$*d.* - *anſ.* 11*l.* 7*s.* $9\frac{1}{2}$*d.*
$90\frac{7}{20}$*cwts.* at 6*l.* 17*s.* 6*d.* - *anſ.* 624*l.* 1*s.* $11\frac{1}{4}$*d.*

The following Queſtions are to exerciſe all the Caſes of the foregoing compound Rules.

What comes 18 elbow chairs to, at 19*s.* 10*d.* a piece?
anſ. 17*l.* 17*s.*

In the ſurvey of a certain river from Water-quay to Marſh-acres, the following diſtances were meaſured, *viz.* from Water-quay to Summer-meadows, 2*m.* 4*fur.* 17*po.* from thence to New Mills, 3 *miles*, from thence to Paſſage Bridge, 1*m.* 1 *fur.* 27*po.* from thence to the Mill-bank fishery 4*m.* 17*po.* from thence to the Ferry-boat-landing, 7 *fur.* 29*po.* and from thence to Marſh-acres, 2*m.* 3 *fur.* how many miles were ſurveyed?
anſ. 14*m.* 1 *fur.* 10*po.*

A borrowed from his friend B 100*l.* of which he paid at one time 10*l.* 19*s.* 6*d.* at another time 21*l.* 18*s.* at another 17*l.* 4*s.* 10*d.* and at another 40*l.* how much remains unpaid?
anſ. 9*l.* 17*s.* 8*d.*

Required the price of 101 gallons of Rum, at 8*s.* 10*d.* per gallon? *anſ.* 44*l.* 12*s.* 2*d.*

A party of 147 ſoldiers having ſeized upon a great quantity of ſtores belonging to the enemy, their commander, as a reward for their bravery, ordered the value of the ſtores to be equally divided among them; each man received 29*l.* 18*s.* $10\frac{1}{2}$*d.* required the value of the ſtores. *anſ.* 4401*l.* 14*s.* $7\frac{1}{2}$*d.*

What comes 73*lb.* of hops to, at 1*s.* $8\frac{1}{2}$*d.* a pound?
anſ. 6*l.* 4*s.* $8\frac{1}{2}$*d.*

A ſeaman being wounded, and for that reaſon diſcharged, came to London and received 54*l.* 18*s.* for 36 months' wages, what was that per month? *anſ.* 1*l.* 10. 6*d.*

If 1 buſhel of wheat coſt 6*s.* 5*d.* what will be the price of 56 buſhels? - - - *anſ.* 17*l.* 19*s.* 4*d.*

A perſon dying, it was found in his will, that he had left to his widow 450*l.* to his eldeſt ſon 1008*l.* 19*s.* 10*d.* to each of

his other three ſons 500*l.* 17*s.* to his two daughters each 300*l.* 14*s.* 9*d.* to five of his near relations each 50*l.* 11*s.* 6*d.* to his ſervants 30*l.* 14*s.* 2*d.* and to the poor of the pariſh 10*l.* 19*s.* 2*d.* how much was left in all? *anſ.* 3857*l.* 11*s.* 2*d.*

If 336*lb.* of cheeſe coſt 7*l.* 7*s.* what was that a pound?

anſ. $5\frac{1}{4}d.$

C borrowed from D 120*l.* of which he paid at one time 19*l.* 19*s.* 6*d.* at another time 40*l.* at another 16*l.* 8*s.* 4*d.* at another 6*l.* 17*s.* 4*d.* and at another 30*l.* how much has he paid in all, and what remains to pay?

anſ. Paid 113*l.* 5*s.* 2*d.* *To pay* 6*l.* 14*s.* 10*d.*

What will be the price of 7 dozens of bottles at $2\frac{1}{2}d.$ a piece?

anſ. 1*s.* 3*d.*

A gentleman paid 21*l.* 6*s.* for a dozen of mahogany chairs, what was that a piece? *anſ.* 1*l.* 15*s.* 6*d.*

How many *cwt.* are there in 17 hogſheads of tobacco, each containing 16*cwt.* 2*qr.* 17*lb.* *anſ.* 283*cwt.* 0*qr.* 9*lb.*

A ſhip, in a Weſt India voyage, cleared 750*l.* ſhe belongs to 8 gentlemen, who have each an equal ſhare of her; required how much each will man receive of the gain? *anſ.* 93*l.* 15*s.*

What may a perſon ſpend a week, out of an eſtate of 1000*l.* a year? *anſ.* 19*l.* 4*s.* $7\frac{1}{4}d.\frac{28}{73}$

Suppoſe the owners of a ſhip at Shields pay 200*l.* 18*s.* 9*d.* for a cargo of 25 keels of coals, what was that a keel?

anſ. 8*l.* 0*s.* 9*d.*

Divide 1779*yds.* 3*qr.* equally among 84 perſons.

anſ. 21*yds.* 0*qr.* 3*nails.*

If 112*lb.* of tobacco coſt 9*l.* 2*s.* what is it a pound?

anſ. 1*s.* $7\frac{1}{2}d.$

What is the weight of 97 kits of ſalmon, when 1 kit weighs 1*qr.* 14*lb.* *anſ.* 36*cwt.* 1*qr.* 14*lb.*

If the clothing of 680 ſoldiers coſt 1181*l.* 10*s.* how much is that for one man? *anſ.* 1*l.* 14*s.* 9*d.*

Divide 11*l.* 19*s.* 9*d.* equally among 12 men. *anſ.* 19*s.* $11\frac{1}{4}d.$

Bought a ſuit of clothes, which contained $4\frac{1}{2}yds.$ at 12*s.* 6*d.* what will it coſt me? *anſ.* 2*l.* 19*s.* $4\frac{1}{2}d.$

What will 36 ſtones of flour come to, at 1*s.* 11*d.* per ſtone?

anſ. 3*l.* 9*s.*

Required the difference between 1*cr.* 2*s.* $2\frac{1}{2}d.$ and 2*l.* 3*s.* 2*groats*? *anſ.* 1*l.* 3*cr.* 1*s.* 1*gr.* $1\frac{1}{2}d.$

Suppoſe A was 20 years of age when B was born, how old will A be when B is 40 years old? *anſ.* 60 *years.*

Divide 26*l.* 10*s.* 3*d.* into 21 equal parts. *anſ.* 1*l.* 5*s.* 3*d.*

If 13 ſilver ſpoons weigh 1*lb.* 7*oz.* 13*dwts.* 6*grs.* what is the weight of one? *anſ.* 1*oz.* 10*dwts.* 6*gr.*

A ſilver-ſmith bought 100 dollars for 19*l.* 11*s.* 8*d.* what did they coſt a piece? *anſ.* 3*s.* 11*d.*

If 42 pieces of cloth contain 735 yards, what is the length of one piece? *anſ.* 17*yds.* 2*qr.*

Thirteen linen-drapers buy 361*yds.* 2*qr.* 1*na.* of linen among them, and agree to pay equally for the ſame; how many yards will each receive. *anſ.* 27*yds.* 3*qr.* 1*na.*

If my income be 48*l.* 15*s.* a year, how much is that a week? *anſ.* 18*s.* 9*d.*

A perſon left 1087*l.* 14*s.* to his two ſons, out of which the youngeſt was to receive 471*l.* 19*s.* what was the eldeſt's ſhare? *anſ.* 615*l.* 15*s.*

A merchant bought 9 cheſts of tea, 4 of which weighed 2*qr.* 24*lb.* each, and the other 5 weighed each 2*qr.* 6*lb.* how many *cwt.* are there in the whole? *anſ.* 5*cwt.* 2*qr.* 14*lb.*

A merchant bought 40 hogſheads of ſugar, 15 of them weighed 8*cwt.* 2*qr.* 14*lb.* each, 20 more weighed 7*cwt.* 3*qr.* each, and the other 5 weighed 7*cwt.* each; how many *cwt.* were in the whole? *anſ.* 319*cwt.* 1*qr.* 14*lb.*

A trader failing was indebted to A 71*l.* 12*s.* 6*d.* to B 34*l.* 9*s.* 9*d.* to C 16*l.* 8*s.* 8*d.* to D 44*l.* to E 19*l.* 19*s.* to F 11*l.* 2*s.* 3*d.* to G 66*l.* 17*s.* 6*d.* and to H a fine of thirty marks. At the time of this diſaſter he had by him in caſh 3*l.* 13*s.* 6*d.* —in commodities 93*l.* 10*s.*—in houſehold furniture 13*l.* 8*s.* 6*d.* —in plate 7*l.* 18*s.* 5*d.*—in a tenement 56*l.* 15*s.*—in recoverable book-debts 67*l.* 13*s.* 10*d.* ſuppoſing theſe things given to his creditors how much will they loſe by him.

anſ. 41*l.* 10*s.* 5*d.*

A merchant ſent his clerk to a fair, where he bought linen to the amount of 105*l.* 12*s.* 11*d.* ſtockings to the amount of 184*l.* 16*s.* 11*d.* he received of accounts due to his maſter 64*l.* 10*s.* and got payment of a bill for 139*l.* 19*s.* he paid ſome few demands, amounting to 19*l.* 19*s.* 11*d.* his account of petty charges came to 1*l.* 14*s.* 6*d.* and he gave back to the merchant 27*l.* 11*s.* 10*d.* How much money had he got from his maſter before he ſet out? *anſ.* 135*l.* 7*s.* 1*d.*

A ſloop with the captain and 26 hands took a prize worth 1578*l.* 15*s.* whereof each ſeaman had 45*l.* 10*s.* and the captain the reſt: How much was his ſhare? *anſ.* 395*l.* 15*s.*

BILLS *of* PARCELS *and* BOOK-DEBTS.

A bill of parcels is an account of goods given when bought, shewing their quantity and price.

A bill of book-debts is either an account of goods sold, or of work done, at sundry times. If part has been paid, the bill shews how much the balance is.

A WOOLLEN DRAPER's BILL.

Mr John Youngman, Bought of *Andrew Clothier.*

March 25th, 1784.	*s.*	*d.*		£.	*s.*	*d.*
4½ *yds* of superfine broad cloth, at	19	6	*per yd.*	4	12	7½
10 — of shalloon, at	1	10	—	0	18	4
4 dozen of buttons, at	1	6	*a doz.*	0	6	0
7¾ *yds* of serge, at	4	9	*per yd.*	1	15	7½
2¼ *yds* of Genoa velvet, at	18	4	—	2	1	3
				9	13	10

A MERCER's BILL.

Mr George Smith, Bought of *Peter Rose.*

May 16th, 1790.	*s.*	*d.*		£.	*s.*	*d.*
15 *yds* of satin, at	9	6	*per yd*	7	2	6
18 — flowered silk, at	17	4	—	15	12	0
12 — rich brocade, at	19	8	—	11	16	0
16 — farcenet, at	3	2	—	2	10	8
13 — Genoa velvet, at	27	6	—	17	17	6
23 — lustring, at	6	3	—	7	3	9
				62	2	5

A WINE MERCHANT's BILL.

Mr George Dramer, Bought of *Thomas Merchant.*

March 29th, 1784.	*s.*	*d.*		£.	*s.*	*d.*
6 *gals* of rum, at	10	6	*per gal.*	3	3	0
10½ — gin, at	11	9	—	6	6	3½
5¼ — brandy, at	14	10	—	3	17	10½
14½ — red port, at	7	11	—	5	14	9½
13 — malaga, at	6	7	—	4	5	7
17⅜ — lisbon, at	9	6	—	8	8	7½
7 — mountain, at	5	8	—	1	19	8
				33	15	10½

A LINEN DRAPER's BILL.

Mrs Eafy,
June 7th, 1784.

Bought of *Wm Sharpman.*

	s.	d.		£.	s.	d.
43½ *yds.* of fine Iriſh linen, at	6	8	*per yd.*	14	11	8
9½ —— Scotch, at	2	7¾	——	2	11	7¼
9¼ —— muſlin, at	3	9	——	1	14	8¾
24 India chintz, at	5	4	——	6	8	0
13¾ cotton, at	2	6	——	1	14	4½
42 handkerchiefs, at	3	7	each	7	10	6
21¼ *yds.* of printed linen, at	3	1	*per yd.*	3	5	6¼
				37	16	4¼

A MARKET BILL.

	s.	d.		£.	s.	d.
19¼ *lb.* of mutton at	0	4¼	*per lb.*	0	6	9½
24½ —— beef	0	4½	——	0	9	2¼
9 fowls	1	4	each	0	12	0
24 ounces of tea	0	8½	*per oz.*	0	17	0
7½ *lb.* lump ſugar	0	9½	*per lb.*	0	6	1¾
21 eggs	0	1¼	each	0	2	2¼
4½ ſtones of flour	2	4	*per ſtone*	0	10	6
				3	3	10

A GROCER's BILL.

Mr Maſterman,
May 4th, 1783.

Bought of *Samuel Retailer.*

	s.	d.		£.	s.	d.
4½ *lb.* of green tea, at	16	9	*per lb.*	3	15	4½
9¼ — bohea	8	7	——	4	3	8¼
6¼ — congo	9	2	——	2	17	3½
17½ — lump ſugar	0	10½	——	0	15	6¼
24¼ — ſoft ſugar	0	6½	——	0	13	1½
6¼ ounces nutmegs	0	1¾	*per oz.*	0	0	11¼
10¼ —— black pepper	0	2¼	——	0	1	11
19¼ *lb.* ſoap	0	8¼	*per lb.*	0	14	2½
				13	2	1¼

A HOSIER's BILL.

		s.	*d.*		*£.*	*s.*	*d.*
23	pair of thread ſtockings, at	6	2	a pair	7	1	10
7	—— lamb wool ditto	7	3	——	2	10	9
31	—— black ſilk ditto	12	6	——	6	17	6
9	—— white ſilk ditto	11	7	——	5	4	3
19	—— worſted ditto	5	3	——	4	19	9
17	—— cotton ditto	6	4	——	5	7	8
					32	1	9

A CORN MONGER's BILL.

		s.	*d.*		*£.*	*s.*	*d.*
29	buſhels of wheat, at	6	4	a buſhel	9	3	8
72½	—— malt	8	2	——	29	12	1
41	—— barley	5	9	——	11	15	9
67¼	—— oats	4	3	——	14	7	11¼
18	—— peas	5	1	——	4	11	6
27¼	—— beans	5	6	——	7	9	10½
7½	—— ſplit peas	6	2	——	2	6	3
					79	7	0¼

Meſſrs *Samſon & Spring*,

1790. To *Almon Manufacturer*, and Co. Dr.

		£.	*s.*	*d.*		*£.*	*s.*	*d.*
Jan. 7.	To 20 blue quilts, at	0	10	11½	each	10	19	7
—— 24.	—— 9 chintz ditto	1	4	9	——	11	2	9
Feb. 24.	—— 15 p. of fine black	0	17	8½	*p. p.*	13	5	7½
Mar. 8.	—— 27 p. of harateen	4	16	10	——	130	14	6
May 1.	—— 19 pieces of cotton	2	19	4	——	56	7	4
June 19.	—— 29 p. of blue linſey	1	18	0	——	45	12	0
						268	1	9½
	July 1ſt, By caſh in part					200		
	Balance					68	1	9½

Mr Timothy Hardwareman,

Bought of *Meſſrs Wholeſale.*

June 30, 1782.	£.	*s.*	*d.*		£.	*s.*	*d.*
17 dozen penknives, at	0	7	6¾	*per doz.*	6	8	6¾
29 fire ſhovels -	0	3	7	*each*	5	3	11
16 dozen iron candleſticks	0	3	1½	*per doz.*	2	10	0
4 dozen handſaws -	2	2	6	———	8	10	0
5 dozen fine ſteel ſnuffers	0	1	6½	*a piece*	4	12	6
2½ — London razors	0	2	4	———	3	10	0
6¾ — Kentiſh hammers	0	5	6½	*a doz.*	1	17	4¾
					32	12	4½

J. Greatman, Eſq.

To Nicholas Bricklayer, Dr.

1784.	£.	*s.*	*d.*		£.	*s.*	*d.*
Ap. 15. To 17 thou. bricks, at	0	18	9	*a thou.*	15	18	9
——— — 4 —— tiles	1	4	6	——	4	18	6
——— — 21 hun. of lime	0	16	4	*a hun.*	17	3	0
——— — 14 load of ſand	0	2	7½	*a load.*	1	16	9
——— — 70 days works	0	3	10	*a day.*	13	8	4
——— — 70 do. for a labourer	0	1	4	——	4	13	4
June 4. — 2 thouſand bricks	0	17	11	*a thou.*	1	15	10
——— — 4 hun. of lime	0	16	4	*a hun.*	3	5	4
——— — 19 days works for ſelf and labourer, at at 4*s.* 11*d.* a day. -					4	13	5
					67	12	9

Mr Alexander Woollendraper,

Bought of *Meſſrs Induſtry.*

Auguſt 1, 1784. *yds.*	*s.*	*d.*		£.	*s.*	*d.*
43¾ of ſuperfine broad cloth, at	17	9	*per yard.*	38	16	6¾
100⅞ of common yard-wide	4	10½	——	24	11	9
72 of fine narrow -	7	4	——	26	8	0
24 of ſuperfine Spaniſh blue	18	6	——	22	4	0
18¼ of ſcarlet -	10	6	——	9	15	6¾
200 of ſhalloon -	1	2½	——	12	1	8
12 dozen of twiſt buttons	1	6	*a doz.*	0	18	0
				134	15	6½

Miss A. R. — *To C. Milliner, Dr.*

May 4th, 1784.	*s.*	*d.*		£.	*s.*	*d.*
19¼ yards Flanders' lace, at	12	10	*a yard.*	12	13	5½
30 —— Ribbon, at	1	1½	——	1	13	9
4 fans	5	6	*a piece.*	1	2	0
9 farſnet hoods	8	11	——	4	0	3
6 pair of lamb gloves	2	3½	*a pair.*	0	13	9
8 —— kid ditto	2	6	——	1	0	0
24¼ yards of fine muſlin	6	10	*a yard.*	8	5	8½
				29	8	11

The Honourable *G. H.* — *To Lionel Silk-mercer, Dr.*

1780. *yds.*	*s.*	*d.*		£.	*s.*	*d.*
Sep. 10, To 17¼ red ſilk, at	10	2	*a yard*	9	0	5½
— 29, — 20 broc. ſatin, at	19	6	——	19	10	0
Oct. 4, — 14¼ paduaſoy, at	6	9	——	4	16	2¼
— 18, — 8 taffety, at	4	2	——	1	13	4
— 26, — 20⅛ ſilk damaſk	16	10	——	16	18	9¼
— 30, — 26¼ luſtring, at	8	2	——	10	14	4½
Nov. 6, — 17 Perſia ſilk,	3	7	——	3	0	11
— 10, — 29¾ white ſatin,	7	9	——	11	10	6¾
— 12, — 30 black ditto	10	4	——	15	10	0
				92	14	7¼

Lady *Ann Highlife*, — *To Henry Linendraper, Dr.*

1782.	*s.*	*d.*		£.	*s.*	*d.*
Mar. 6, To 17½ ells of holland, at	6	4	*p. ell*	5	10	10
—— — 40*yds* of Iriſh linen,	6	10	*p. yd*	13	13	4
Apr. 19 — 27 —— cambrick	7	2	——	9	13	6
—— — 6 —— muſlin	4	3	——	1	5	6
——27 — 12¾ — diaper	3	6	——	2	4	7½
May 1, — 60 —— home linen	2	9	——	8	5	0
——24 — 24 —— bobbin	0	2¼	—	0	4	6
				40	17	3½

RULE OF THREE.

THIS Rule is called the Rule of three, becauſe in it there are three numbers given, to find a fourth.

RULE.

Obſerve that of the three given numbers, two are ſuppoſed, and on the other lies a demand.* The number on which the demand lies, muſt always be the third term in the ſtating; of the other two, you will find one of the ſame kind, make it the firſt, conſequently the remaining number will be the ſecond, or middle term, and it is of the ſame kind with what is required. Reduce each number to its loweſt denomination, and the firſt and third to the ſame name: Then conſider whether more or leſs than the middle term be required; if more, make the leſs extreme the divifor; if leſs, the greater extreme, and the product of the other two terms the dividend; divide, and the quotient will be the anſwer in the ſame name as you left your ſecond number.

Note. The firſt and laſt terms are called extremes.

* The number the demand lies on, may be known by the words, how much? what will? how long? what coſt? how many? what comes, &c.

1. If 7*cwt.* coſt 2*l.* how much will 5*cwt.* come to?
anſ. 15*l.*

2. If 13*yds* coſt 16*l.* how much will 39*yds* come to?
anſ. 48*l.*

3. How much will 32*lib.* come to, when 4*lb.* coſt 19*s.*
anſ. 7*l.* 12*s.*

4. If 27 men can do a piece of work in 16 days, how many can do the ſame in 12 days? *anſ.* 36 *men.*

5. Suppoſe 4 clerks can copy a piece of writing in 72 hours, how many could do the ſame in 18 hours? *anſ.* 16 *clerks.*

6. If 4 *yds* of cloth coſt 3*s.* what will 24 *yds* coſt? *anſ.* 18*s.*

7. How many yards of carpeting, which is 3*qrs.* broad, will cover a room which is 3 yards in breadth, and 4 yards in length?
anſ. 16.

8. If 8 pounds of tea coſt 2*l.* 12*s.* what will 19 pounds come to? *anſ.* 6*l.* 3*s.* 6*d.*

9. What will 8 pounds of tea come to, when 19 pounds coſt 6*l.* 3*s.* 6*d.* *anſ.* 2*l.* 12*s.*

10. Bought 31 pounds of hops for 2*l.* 6*s.* 6*d.* what will 60 pounds come to? *anſ.* 4*l.* 10*s.*

11. If 60 pounds of hops coſt 4*l.* 10*s.* how much will 31 pounds coſt? *anſ.* 2*l.* 6*s.* 6*d.*

12. If 43 yards of cloth coſt 5*l.* 7*s.* 6*d.* how many yards may be bought for 16*l.* 2*s.* 6*d.* *anſ.* 129.

13. If 42 men can perform a piece of work in 36 days, how many men will it take to finiſh the ſame in 6 days? *anſ.* 252.

14. Suppoſe 1*l.* 4*s.* 8*d.* be paid for 8 ſtones of beef, how much will 23 ſtones come to? *anſ.* 3*l.* 10*s.* 11*d.*

15. If a certain number of men take 6 months to build a houſe, when they work 12 hours a day; in what time would they build it, if they work but 9 hours a day? *anſ.* 8 *months.*

16. What comes 27 pounds of ſilver to, at 5*s.* 3*d.* the ounce? *anſ.* 85*l.* 1*s.*

17. How much ſilver will 85*l.* 1*s.* buy, at 5*s.* 3*d.* the ounce? *anſ.* 27*cwt.*

18. If 10½ yards of cloth coſt 1*l.* 11*s.* 6*d.* what will 27½ yards come to? *anſ.* 4*l.* 3*s.* 3*d.*

19. If 16 men incloſe a garden with a brick wall in 31½ days, how many could do the ſame in 72 days? *anſ.* 7.

20. What will 3½ ſtones of cheeſe coſt, at 2*l.* 5*s.* 4*d.* per *cwt.* *anſ.* 19*s.* 10*d.*

21. If it take 70 yards of paper, which is 2 *feet* 5 *in.* broad, to hang a room; how many yards will it take of 1 *foot* 8 *in.* broad? *anſ.* 101½.

22. How many quills will 17*l.* 15*s.* 4*d.* purchaſe, at 6*s.* 10*s.* per hundred? *anſ.* 5200.

23. How many *cwt.* of beef may be bought for 18*l.* 10*s.* when one ſtone coſt 3*s.* 1*d.* *anſ.* 15.

24. How long will I take to lay up 1006*l.* at 1*l.* 5*s.* per week? *anſ.* 15 *years*, 20 *weeks.*

25. How many yards of ſhalloon, which is 3 *qrs.* broad, will line 25 yards of cloth, that is 5*qrs* broad? *anſ.* 41⅔.

26. What will 3*qr.* 3*na.* of tapeſtry come to, at 6*s.* 8*d.* per ell Flemiſh? *anſ.* 8*s.* 4*d.*

27. How many yards of cloth, at 7*s.* 6*d.* per yard, muſt be given for 72 yards, at 6*s.* 3*d.* per yard? *anſ.* 60.

28. If 1*yd* 2*qrs* of velvet coſt 14*s.* 6*d.* how many yards will 21*l.* 15*s.* 6*d.* buy? *anſ.* 45*yds.* $0\frac{36}{144}$*qr.*

29. How much is a gentleman's eſtate worth a year when he pays 500*l.* 15*s.* land-tax, at 3*s.* 9*d.* per pound?
anſ. 2670*l.* 13*s.* 4*d.*

30. If a paſture can maintain 7 horſes, 6 weeks; how long would it maintain 35 horſes? *anſ.* $1\frac{1}{5}$ *week.*

31. If 100*l.* gain a certain ſum in 12 months, how much will it take to gain the ſame in 9 months? *anſ.* 133*l.* 6*s.* 8*d.*

32. How much will a ſhip's cargo, of 22 keels of coals, come to, at 15*s.* 9*d.* per chaldron? *anſ.* 138*l.* 12*s.*

33. A fabric was reared by 120 men in 8 months; another is required to be reared in 5 months; how many men will it take? *anſ.* 192.

34. How long will I take to ſpend 30*l.* 15*s.* at 10*s.* 3*d.* a week? *anſ.* 60 *weeks.*

35. If 7*cwt.* 3*qr.* of tobacco coſt 24*l.* 17*s.* 9*d.* what will 22*cwt.* 1*qr.* come to? *anſ.* 71*l.* 9*s.* 0*d.* $1\frac{5}{11}$*qr.*

36. Suppoſe a perſon can perform a journey in 24 days, when the day is 12 hours long; how many days will he take when the day is but 7 hours long? *anſ.* $41\frac{1}{7}$.

37. A perſon owes 1000*l.* but not being able to pay the whole, he compounds with his creditors for 10*s.* 6*d.* a pound; how much will they receive? *anſ.* 525*l.*

38. If a merchant owe 1500*l.* and his effects amount to 787*l.* 10*s.* what will his creditors receive per pound? *anſ.* 10*s.* 6*d.*

39. If the ſixpenny loaf weigh 2*lib.* 11*oz.* when wheat is 6*s.* 4*d.* the buſhel; how much will it weigh when wheat is 5*s.* 2*d.* the buſhel? *anſ.* 3*lib.* 4*oz.* $11\frac{2}{52}$*drs.*

40. Suppoſe 18 pioneers can make a trench in 7 days, how many will it take to do the ſame in $1\frac{3}{4}$ day? *anſ.* 72.

41. What will 67*chal.* 17*buſh.* of coals, Newcaſtle meaſure, come to, at 1*l.* 15*s.* 9*d.* per chaldron? *anſ.* 120*l.* 4*s.* $2\frac{1}{4}$*d.*

42. How many acres does a gentleman's eſtate conſiſt of, which he lets, on an avarage, at 1*l.* 10*s.* 10*d.* an acre, and has 817*l.* 1*s.* 8*d.* per annum for the ſame? *anſ.* 530.

43. A merchant ſold 150 pieces of linen, each containing 72 ells Flemiſh, at 4*s.* 9*d.* per ell Engliſh; what did they come to? *anſ.* 1539*l.*

44. Bought 10 bales of cloth, each meaſuring 27 *yds.* 2*qr.* 3*na* what will they coſt, at 4*s.* 9*d.* per ell Flemiſh?
anſ. 87*l.* 13*s.* $6\frac{1}{2}$*d.*

45. A gold-ſmith bought a wedge of gold, which weighed

2*lb.* 10*oz.* 10*dwts.* for 120*l.* 15*s.* what did it coſt him per ounce? *anſ.* 3*l.* 10*s.*

46. How much muſt be paid for 20*cwt.* of ſugar, when 107*l.* 10*s.* 6*d.* was paid for 4 hogſheads of the ſame kind, that weighed 49*cwt.* 3*qr.* 14*lib.* *anſ.* 43*l.* 2*s.* 4*d.* $1\frac{463}{518}$*qr.*

47. A draper bought ſix bales of cloth, each containing 9 pieces, and each piece 17 yards, at 4*s.* 6*d.* per yard; required the price of the ſix bales. *anſ.* 206*l.* 11*s.*

48. If an anchor of brandy, containing 10*gal.* 3*qrt.* coſt 6*l.* 9*s.* what will 3 anchors come to, each containing 9*gal.* 2*qrt.* 1*pint.* *anſ.* 17*l.* 6*s.* 6*d.*

49. What will 15 frails of raiſons, each 1*cwt.* 1*qr.* 17*lib.* come to at 3*l.* 1*s.* 6*d.* per *cwt.* *anſ.* 64*l.* 13*s.* 1*d.* $3\frac{1}{112}$*qr.*

50. Bought 12 cheſts of oranges, each 1*cwt.* 1*qr.* 16*lib.* at 17*s.* 10*d.* what will they come to? *anſ.* 14*l.* 18*s.* 0*d.* $\frac{3}{4}\frac{48}{112}$*qr.*

51. What coſt 17 hogſheads of tobacco, each 11*cwt.* 2*qr.* 19*lib.* at 4*l.* 19*s.* 6*d.* per *cwt.* *anſ.* 986*l.* 19*s.* 2*d.* $\frac{1}{4}\frac{72}{112}$*qr.*

52. What is the value of a piece of cloth, meaſuring 72*yds.* 3*qr.* at 8*s.* 8*d.* per ell Scotch? *anſ.* 30*l.* 10*s.* 1*d.* $3\frac{138}{180}$*qrs.*

53. What will 12 ingots of gold, each weighing 3*lib.* 4*oz.* 12*dwts.* 12*gr.* come to, at 3*l.* 10*s.* 6*d.* per *oz.*
anſ. 1718*l.* 8*s.* 9*d.*

54. If I lend a perſon 650*l.* for 22 months; how long ought he to lend me 1100*l.* 10*s.* to requite my kindneſs?
anſ. 12*mo.* 3*weeks*, $6\frac{18}{21}\frac{3}{0}\frac{7}{1}$*days.*

55. What is a gentleman's eſtate worth per annum, who ſpends every day 4*l.* 10*s.* 10*d.* and lays up at the year's end 700*l.* *anſ.* 2357*l.* 14*s.* 2*d.*

56. A merchant bought 472 ells Flemiſh of cloth, for 88*l.* 1*s.* 3*d.* beſides 3*l.* 7*s.* 9*d.* expences; what did it coſt him a yard? *anſ.* 5*s.* 2*d.*

57. A factor bought 76 pieces of cloth for 712*l.* 10*s.* at 7*s.* 6*d.* per yard; required how many yards were in the whole, and how many in each piece?
anſ. 1900*yds.* in the whole, and 25*yds.* in each piece.

RULE OF FIVE.

THIS Rule is called the Rule of five, becauſe in it there are five numbers given to find a ſixth.

RULE.

Obſerve that of the five given numbers, three contain a ſuppoſition, and two a demand, the numbers on which the demand lies muſt be the fourth and fifth terms in the ſtating; of the other three, you will find two of the ſame kind, make them the firſt and ſecond, ſo that the firſt be of the ſame kind with the laſt, and the ſecond with the fourth; conſequently the remaining number will be the middle term, and it is of the ſame kind with what is required.

Bring each number to its loweſt denomination, the firſt and laſt, as alſo the ſecond and fourth, to the ſame name. Then conſider the firſt, middle, and laſt; and the ſecond, middle and fourth terms; each as a ſtating in the Rule of three, and by the directions given in that rule, find the two diviſors, and multiply them together; alſo multiply the other three terms together for a dividend; then divide, and the quotient will be the anſwer in the ſame denomination as you left your middle number.

1. If 100 men make 3 miles of road in 27 days, in how many days will 150 men make 5 miles? *anſ.* 30.

2. If 18 men make uſe of 18 buſhels of corn in 28 days, how many will ſerve 24 men 56 days? *anſ.* 48.

3. If 8 cannons in 1 day ſpend 48 barrels of gun-powder, how many will 24 cannons ſpend in 12 days? *anſ.* 1728.

4. If 40 pints of wine ſerve 8 men, 7 days, how much will ſerve 24 men, 28 days? *anſ.* 60*gal.*

5. Suppoſe a perſon can travel 360 miles in 12 days, when he travels 8 hours each day; how many miles will he travel in 60 days, at 6 hours each day? *anſ.* 1350.

6. If 100*l.* in a year gain 4*l.* 10*s.* what will be the intereſt of 350*l.* for 3 years? *anſ.* 47*l.* 5*s.*

7. If 350*l.* gain 47*l.* 5*s.* in three years what is that per cent per annum? *anſ.* 4*l.* 10*s.*

8. Suppoſe 28 horſes can eat 700 buſhels of oats in 100 days, how many can eat 50 quarters in 25 days? *anſ.* 64.

9. Suppoſe 12 men can mow 49 acres of meadow in 4 days; how many acres will 18 men mow in 22 days? *anſ.* 404¼.

10. If 150 workmen can build a fort in 35 days of 12 hours long; in how many days of 10 hours long, could 25 workmen do the ſame? *anſ.* 252.

11. If when wheat is 5*s.* 8*d.* the buſhel, the penny loaf

weigh 7*oz.* how much ſhould the ſixpenny loaf weigh when wheat is at 4*s.* 11*d.* the buſhel? *anſ.* 3*lb.* 0*oz.* $6\frac{10}{32}$*drs.*

12. What will the wages of 10,000 men come to, in $4\frac{1}{2}$ years; when the wages of 4 men for 6 months, amount to 25*l.* 4*s.*

anſ. 567000*l.*

13. A perſon put out 150*l.* to intereſt, and after it had continued 7 years, he received 199*l.* 17*s.* 6*d.* for principal and intereſt; at what rate was that per cent per annum?

anſ. 4*l* 15*s.*

14. If the carriage of 160*cwt.* for 120 miles coſt 14*l.* 10*s.* what weight ought to be carried 420 miles for 72*l.* 10*s.*

anſ. 228*cwt.* 2*qr.* 8*lb.*

PRACTICE.

PRACTICE is a compendious method of finding the value of any quantity more than 1, or when it conſiſts of ſundry denominations, having the price of 1 of the ſame name given. Queſtions in this rule are ſolved by taking even, or aliquot parts.

Note. One number is an aliquot, or even part, of another, when the one divides the other without a remainder.

The TABLE.

s.	*d.*		*l.*
10	0	is the	$\frac{1}{2}$
6	8	——	$\frac{1}{3}$
5	0	——	$\frac{1}{4}$
4	0	——	$\frac{1}{5}$
3	4	——	$\frac{1}{6}$
2	6	——	$\frac{1}{8}$
2	0	——	$\frac{1}{10}$
1	8	——	$\frac{1}{12}$
	d.		*s.*
	6	is the	$\frac{1}{2}$
	4	——	$\frac{1}{3}$
	3	——	$\frac{1}{4}$
	2	——	$\frac{1}{6}$
	$1\frac{1}{2}$	——	$\frac{1}{8}$
	1	——	$\frac{1}{12}$

qrs.		*d.*
2	is the	$\frac{1}{2}$
1	——	$\frac{1}{4}$

Avoirdupoiſe Weight.

cwt.		*tun.*
10	——	$\frac{1}{2}$
5	——	$\frac{1}{4}$
4	——	$\frac{1}{5}$
$2\frac{1}{2}$	——	$\frac{1}{8}$
2	——	$\frac{1}{10}$
qr. *lb.*		*cwt.*
2 0	——	$\frac{1}{2}$
1 0	——	$\frac{1}{4}$
0 16	——	$\frac{1}{7}$
0 14	——	$\frac{1}{8}$

Troy Weight.

dwt.	*gr.*		*oz.*
10	0	——	$\frac{1}{2}$
6	16	——	$\frac{1}{3}$
5	0	——	$\frac{1}{4}$
4	0	——	$\frac{1}{5}$
3	8	——	$\frac{1}{6}$
2	12	——	$\frac{1}{8}$
2	0	——	$\frac{1}{10}$
1	16	——	$\frac{1}{12}$

 Thomas Bell

CASE I.

When the price is an even part (under $\frac{1}{12}$) of a penny, shilling, or pound.

RULE.—Divide the given quantity by the part which the price is of a penny, shilling, or pound, and the quotient will be the answer in pence, shillings, or pounds, respectively.

	s.	d.	£.	s.	d.
714 at	10	—	357	—	—
573 —	2	6	21	12	6
614 —	1	8	51	3	4
166 —	6	8	55	6	8
274 —	1	—	1	2	10
874 —	6	—	21	17	—
1107 —	3	4	184	10	—
718 —	5	0	179	10	—

	s.	d.	£.	s.	d.
188 —	4	0	37	12	—
157 —	2	0	15	14	—
872 —	—	$1\frac{1}{2}$	5	9	—
217 —	—	4	3	12	4
714 —	—	$0\frac{1}{4}$	0	14	$10\frac{1}{2}$
917 —	—	3	11	9	3
197 —	—	$0\frac{1}{2}$	0	8	$2\frac{1}{2}$
418 —	—	2	3	9	8

CASE II.

When the price is less than one shilling, and not an even part of a penny, or shilling (under $\frac{1}{12}$).

RULE.—Divide it into several even parts, or the less into even parts of the greater, and work for each by case first, their sum will be the answer.

	d.	£.	s.	d.
672 at	$\frac{3}{4}$ —	2	2	0
467 —	$1\frac{1}{4}$ —	2	8	$7\frac{3}{4}$
511 —	$1\frac{1}{2}$ —	3	14	$6\frac{1}{4}$
729 —	$2\frac{1}{4}$ —	6	16	$8\frac{1}{4}$
172 —	$2\frac{1}{2}$ —	1	15	10
237 —	$2\frac{3}{4}$ —	2	14	$3\frac{3}{4}$
482 —	$3\frac{1}{4}$ —	6	10	$6\frac{1}{2}$
617 —	$3\frac{1}{2}$ —	8	19	$11\frac{1}{2}$
448 —	$3\frac{3}{4}$ —	7	0	0
517 —	$4\frac{1}{4}$ —	9	3	$1\frac{1}{4}$
827 —	$4\frac{1}{2}$ —	15	10	$1\frac{1}{2}$
615 —	$4\frac{3}{4}$ —	12	3	$5\frac{1}{4}$
724 —	5 —	15	1	8
812 —	$5\frac{1}{4}$ —	17	15	3
924 —	$5\frac{1}{2}$ —	21	3	6

	d.	£.	s.	d.
748 —	$5\frac{3}{4}$ —	17	18	5
1074 —	$6\frac{1}{4}$ —	27	19	$4\frac{1}{2}$
497 —	$6\frac{1}{2}$ —	13	9	$2\frac{1}{2}$
2748 —	$6\frac{3}{4}$ —	77	5	9
518 —	7 —	15	2	2
604 —	$7\frac{1}{4}$ —	18	4	11
809 —	$7\frac{1}{2}$ —	25	5	$7\frac{1}{2}$
7148 —	$7\frac{3}{4}$ —	230	16	5
817 —	8 —	27	4	8
600 —	$8\frac{1}{4}$ —	20	12	6
614 —	$8\frac{1}{2}$ —	21	14	11
517 —	$8\frac{3}{4}$ —	18	16	$11\frac{3}{4}$
1774 —	9 —	66	10	6
642 —	$9\frac{1}{4}$ —	24	14	$10\frac{1}{2}$
484 —	$9\frac{1}{2}$ —	19	3	2

	£.	s.	d.
1486 — 9¾ —	60	7	4½
4761 — 10 —	198	7	6
444 — 10¼ —	18	19	3
617 — 10½ —	26	19	10½
643 — 10¾ —	28	16	—¼

	£.	s.	d.
427 — 11 —	19	11	5
1148 — 11¼ —	53	16	3
407 — 11½ —	19	10	0½
555 — 11¾ —	27	3	5¼

CASE 3.

When the price is any number of ſhillings.

RULE.—Multiply the given quantity by them, and divide the product by 20, for the anſwer in pounds.

Note. If the price be an even number of ſhillings, under 20, multiply the quantity by half their number, doubling the firſt figure of the product for ſhillings, the reſt are pounds.

	s.	£.	s.
621 at	2	62	2
428 —	3	64	4
777 —	4	155	8
882 —	5	220	10
667 —	6	200	2
1100 —	7	385	0
682 —	8	272	16
400 —	9	180	0
614 —	10	307	0
816 —	11	448	16

	s.	£.	s.
1469 —	12	881	8
783 —	13	508	19
855 —	14	598	10
609 —	15	456	15
182 —	16	145	12
210 —	17	178	10
314 —	18	282	12
639 —	19	607	5
416 —	22	457	12
699 —	24	838	16

CASE 4.

When the price conſiſts of ſhillings and pence; or of ſhillings, pence, and farthings.

RULE.—Multiply the quantity by the ſhillings, then take even parts for the odd money, as in caſes firſt and ſecond, and add them together for the anſwer in ſhillings.

	s.	d.	£.	s.	d.
298 at	1	1¼	16	2	5
671 -	1	8¾	58	0	3¼
279 -	1	6	20	18	6
181 -	2	9¾	25	9	0¾
377 -	3	10½	73	0	10½

	s.	d.	£.	s.	d.
417 -	4	9	99	0	9
4876 -	4	11½	1208	16	10
2110 -	5	7	589	0	10
822 -	5	8¾	235	9	4½
748 -	6	9¼	253	4	7

	s.	d.	£.	s.	d.		s.	d.	£.	s.	d.
666 -	6	10¾	229	12	7½	164 -	10	3¾	84	11	3
427 -	7	2	153	—	2	198 -	11	11¼	118	3	7½
1784 -	7	5½	665	5	8	214 -	12	9	136	8	6
421 -	8	6¾	180	4	9¾	278 -	13	8	189	19	4
672 -	8	7½	289	16	0	341 -	14	5	245	16	1
807 -	9	2¼	370	14	3¾	374 -	15	2¾	284	15	8½
172 -	9	4½	80	12	6	669 -	17	8	590	19	0

Case 5.

When the pence consists of pounds with some odd money, which is an even part of a pound (under $\frac{1}{15}$).

Rule.—Multiply the quantity by the pounds, then, by case first, find the value of the odd money, and add them together.

	l.	s.	d.	£.	s.	d.		l.	s.	d.	£.	s.	d.
572 at	3	3	4 -	1811	6	8	176 -	7	6	8 -	1290	13	4
488 -	6	2	6 -	2989	0	0	515 -	16	1	8 -	8282	18	4
375 -	10	5	0 -	3843	15	0	917 -	4	4	0 -	3851	8	0

Case 6.

When the price consists of pounds, with some odd money, which is not an even part of a pound.

Rule.—Bring the pounds and shillings to shillings, and multiply the quantity by the number of them; then find the value of the odd money by cases first and second, which added to the product of the shillings, will give the answer in shillings.

			£.	s.	d.		£.	s.	d.
1.	1487	at	4	4	8¼	———	6296	10	3¾
2.	866	—	6	2	11½	———	5324	1	11
3.	648	—	2	17	6	———	1863	0	0
4.	1007	—	5	8	2¾	———	5449	6	9¼
5.	421	—	20	0	9¼	———	8436	4	6¼
6.	611	—	5	1	4½	———	3097	0	1½
7.	189	—	3	14	7½	———	705	4	1½
8.	210	—	5	16	3¾	———	1221	5	7½
9.	607	—	10	0	9¼	———	6093	7	10¾
10.	514	—	2	18	3	———	1497	0	6
11.	214	—	1	14	6	———	369	3	0
12.	666	—	7	0	10	———	4689	15	0

CASE 7.

When there is a fraction in the quantity.

RULE.—Find the value of the whole number by the foregoing rules, and for the fraction multiply the price by the numerator, and divide the product by the denominator, the quotient added to the value of the whole number will give the answer.

			£.	s.	d.		£.	s.	d.
1.	275 5/8	at	0	6	8	———	91	17	6
2.	184 3/7	—	0	0	11 3/4	———	9	0	7
3.	166 1/8	—	0	3	9 1/2	———	31	9	10 1/2
4.	721 4/7	—	0	18	0	———	649	12	4 3/4
5.	184 1/8	—	0	4	7 1/4	———	42	8	10 1/2
6.	419 2/9	—	0	5	11	———	124	0	4 3/4
7.	1417 1/7	—	0	17	0	———	1204	12	4 3/4
8.	1746 1/12	—	1	2	6	———	1964	6	10 1/2
9.	426 1/8	—	4	8	7 1/2	———	1891	8	1 1/4
10.	344 3/11	—	0	5	4 1/4	———	92	3	3 1/2
11.	157 1/14	—	0	0	6	———	3	18	7 1/4
12.	7148 4/9	—	0	0	1 1/2	———	44	13	6 1/2
13.	617 1/7	—	1	17	6	———	1157	8	2 1/2
14.	217 1/3	—	2	3	4	———	470	12	0

CASE 8.

When the quantity consists of several denominations.

RULE.—Multiply the price by the number of integers, if they be less than 157, but if greater, find their value by the former cases; and for the other denomination of the quantity, take even parts of the price of the integer, or of each other, and add them to the value of the integral part for the answer.

Note. To know which are the integers, observe, when the price is at so much per *cwt.* then the number of *cwts.* in the quantity are integers; when at so much per yard, the yards are integers; when at so much per ounce, the ounces are integers, &c.

	yds.	*qr.*	*na.*		s.	d.		£.	s.	d.
1.	13	2	0	at	16	9	*per yard*	12	2	10 1/2
2.	6	2	3	—	7	10	———	2	12	4 1/2
3.	0	3	2 1/2	—	18	0	———	0	16	3 1/2
4.	1117	3	0	—	4	11 1/4	———	278	5	5 1/4

	yds.	qr.	na.			s.	d.		£.	s.	d.
5.	614	2	2	at		9	7	per yd.	294	10	1¾
	gal.	qt.	pt.								
6.	4	1	1	at		3	6	per gal.	0	15	3¾
7.	7	2	0	—		4	1	—	1	10	7½
8.	20	3	1	—		2	6½	—	2	13	0½
9.	18	3	0	—		3	2	—	2	19	4½
10.	0	3	1	—		2	4	—	0	2	0½
11.	0	1	1½	—		3	8	—	0	1	7¼
	qr.	bush.	p.		£.						
12.	7	4	2	at	1	17	4	per qr.	14	2	4
13.	6	7	1	—	2	4	8	—	15	8	5¾
14.	0	2	3	—	2	1	7	—	0	14	3¼
15.	0	3	2	—	0	6	4	per bush.	1	2	2
16.	0	6	1	—	0	4	7	—	1	8	7¾
17.	0	2	3	—	0	4	9	—	0	13	0¾
	oz.	dwt.	gr.								
18.	7	15	0	—	0	5	2½	per oz.	2	0	4¼
19.	4	6	12	—	0	4	7¾	—	1	0	0¾
20.	0	19	17	—	0	4	11	—	0	4	10¾
	ſt.	lb.		s.	d.						
21.	11	7	at	3	11	per ſtone.		—	2	5	0½
	cwt.	qr.	lib.			l.	s.	d.			
22.	142	3	0	—		0	15	9	per cwt.	112	8	3¾
23.	72	1	16	—		0	1	8	—	6	0	7¾
24.	18	0	14	—		0	17	6½	—	15	17	11¼
25.	9	2	18	—		0	14	11	—	7	4	1
26.	189	2	7	—		0	5	10¾	—	55	17	7¼
27.	217	2	10½	—		0	19	0	—	206	14	3¼
28.	7	0	27	—		4	2	7	—	29	17	11½
29.	0	3	18	—		10	6	4	—	9	7	10½
30.	0	1	21½	—		4	6	7	—	1	18	2¾

CASE 9.

When the given quantity is not of the ſame name with the integer whoſe price is given.

RULE.—Reduce it to the ſame name, then, if it be below 157, find its value by compound multiplication; but if above, by practice.

	s.	d.		£.	s.	d.
17 *hhds.* wine, at	7	2	*per gal.*	383	15	6
34 — of beer, London measure	1	1½	———	103	5	6
7 *cwt.* of ſugar, at	0	9¼	*per lb.*	31	17	0
14 — of flax, at	6	9	*per ſtone*	37	16	0
6¼ tons of tallow, at	7	4	———	381	6	8
9 *cwt.* of beef, at	2	11	———	10	10	0
20 *anc.* brandy, at	11	6	*per gal.*	115	0	0
6 *pun.* rum, at	10	9	———	270	18	0
60 *lib.* of tea, at	0	7½	*per oz.*	30	0	0
8 ſtones of bacon, at	0	5½	*per lb.*	2	11	4
17 —— of ſoap, at	0	6¼	———	6	3	11½
19 gallons of gin, at	2	5½	*per quart*	9	6	10
4 laſts of wheat, at	10	6	*per boll.*	84	0	0
7 thouſand quills, at	2	9	*per hundred*	9	12	6
21 reams of paper, at	1	3	*per quire*	26	5	0
25 fodders of lead, at	5	6	*per quarter*	536	5	0
16 *lb.* of cloves, at	1	3	*per oz.*	16	0	0
17 chaldrons of coals, (Newcaſtle meaſure.)	0	7½	*per buſh.*	36	2	6
27 *doz.* of candles, at	0	6½	*per lb.*	8	15	6
6 laſts of barley, at	3	4	*per buſh.*	80	0	0
19 ſtones of leather, at	0	10½	*per lb.*	11	12	9
150 laſts of wheat, at	10	11½	*per boll.*	3287	10	0
8 *doz.* pair of gloves, at	1	5	*per pair*	6	16	0
1 *cwt.* of tea, at	4	5¼	*per lb.*	24	17	0

TARE *and* TRET.

GROSS weight of goods, is the weight both of the commodity and of the cheſt, hogſhead, barrel, &c. in which they are contained.

Tare is an allowance made by the king to the importer, or by the ſeller to the buyer, for the weight of the cheſt, hogſhead, barrel, bag, &c. in which the goods are packed.

Tret is an allowance of 4 *lb.* on 104 *lb.* or an abatement of the 26th. part of what remains after the tare is taken from the groſs, on goods ſubject to waſte.

Cloff is an allowance of 2 *lb.* for 3 *cwt.* made to the retailer, to make the weight hold out.

Neat weight is what remains after all the required deductions are made.

Suttle is what remains after the tare is taken from the groſs, when there are more deductions to be made.

Note. Tare of ſeveral goods is regulated by the book of rates; and ſometimes the cheſt, hogſhead, &c. is weighed before the goods are packed, and their weight inſerted in the invoice along with the groſs.

CASE I.

When the allowance is only made for tare.

RULE.—Subtract the whole tare from the whole groſs, and the difference will be the neat weight.

When the tare is at ſo much per cheſt, hogſhead, &c. multiply the tare of one cheſt, &c. by the number of cheſts, hogſheads, &c. and the product will be the whole tare.

When the tare is at ſo much per *cwt.* take ſuch parts out of the whole groſs, as in practice.

1. Suppoſe 3*qr.* 17*lb.* tare, to be allowed on 27*cwt.* 1*qr.* groſs, what will be the neat weight? *anſ.* 26*cwt.* 1*qr.* 11*lb.*

2. Groſs 100*cwt.* tare 2*cwt.* 17*lb.* how much neat weight? *anſ.* 97*cwt.* 3*qr.* 11*lb.*

3. What is the neat weight of 10*hhds.* of ſugar, weighing in all 130*cwt.* groſs, tare at 2*qr.* 16*lb.* per hogſhead? *anſ.* 123*cwt.* 2*qr.* 8*lb.*

4. What is the neat weight of 21 hogſheads of tobacco, each weighing 13*cwt.* 1*qr.* 20*lb.* groſs, tare on the whole 12*cwt.* 1*qr.* *anſ.* 269*cwt.* 3*qr.*

5. What is the neat weight of five barrels of Indigo, weighing as follows.

	cwt.	*qr.*	*lb.*		*lb.*	
No. 1.	4	1	13	tare	18	
— 2.	2	3	17	—	16	
— 3.	3	1	4	—	17	
— 4.	2	1	2	—	14	
— 5.	5	3	27	—	20	
					—	*qr.* *lb.*
	18	3	7	*groſs.*	85 = 3	1.
	0	3	1	*tare.*		
	18	0	6	*neat.*		

6. Bought 20 bales of Smyrna silk, each bale weighing 2*cwt.* 1*qr.* 17*lb.* gross, tare at 16*lb.* per bale, how much neat weight?

anf. 45*cwt.* 0*qr.* 20*lb.*

7. What is the neat weight of 74*cwt.* 2*qr.* 12*lb.* gross, tare at 14*lb.* per *cwt.* *anf.* 65*cwt.* 1*qr.* 3$\frac{1}{2}$*lb.*

8. How much neat will there be in four bags of hops, weighing as under, at 4$\frac{1}{2}$*lb.* per *cwt.* for tare?

	cwt.	*qr.*	*lb.*
No. 1.	7	1	18
— 2.	4	3	20
— 3.	6	2	3
— 4.	7	2	0

anf. 25*cwt.* 1*qr.* 6$\frac{1}{2}$*lb.*

9. In 5 casks of oil, weighing 30*cwt.* 0*qr.* 17$\frac{3}{4}$*lb.* gross, how many gallons, allowing 18*lb.* per *cwt.* for tare? *anf.* 378.

CASE 2.

When tare and tret; or when tare, tret, and cloff are allowed, to find the neat weight.

RULE.—When tare and tret are allowed, divide the suttle by 26, and subtract the quotient from it, the difference will be the neat weight. When tare, tret, and cloff are allowed, divide the difference between the tret and the suttle by 168, subtract the quotient from that difference, and the remainder will be the neat weight.

1. What is the neat weight of 19*cwt.* 1*qr.* 14*lb.* when 18*lb.* per *cwt.* is allowed for tare, and 4*lb.* per 104*lb.* for tret?

anf. 15*cwt.* 2*qr.* 15$\frac{1}{4}$*lb.*

2. A merchant bought 4 casks of oil, which weighed 3*cwt.* 1*qr.* 19*lb.* gross per cask, tare at 16$\frac{1}{2}$*lb.* per *cwt.* tret 4*lb.* per 104*lb.* cloff 2*lb.* per 3*cwt.* how many neat gallons were in the whole? *anf.* 166$\frac{8}{11}$.

3. Required the neat weight of 4 hogsheads of sugar, weighing as follows?

	cwt.	*qr.*	*lb.*	
No. 1.	12	2	17	Tare at 12*lb.* per *cwt.* tret at 4*lb.* per 104*lb.* and cloff 2*lb.* per 3*cwt.*
— 2.	8	2	14	
— 3.	10	0	0	
— 4.	6	3	27	

anf. 32*cwt.* 2*qr.* 18 *lb.*

4. Gross 43*cwt.* 2*qr.* 17*lb.* tare 2*cwt.* 2*qr.* 17*lb.* tret and cloff as usual, how much neat?

anf. 39*cwt.* 0*qr.* 21$\frac{1}{4}$*lb.*

5. A merchant bought 6 hogsheads of sugar, whose weight is below, how much will they cost, at 2*l.* 2*s.* the neat *cwt.*

	cwt.	*qr.*	*lb.*	
No. 1.	7	3	12	tare 2*qr.* 27*lb.* each.
— 2.	6	3	27	
— 3.	8	1	4	
— 4.	8	0	17	
— 5.	6	3	4	
— 6.	7	2	16	*anf.* 86*l.* 13*s.* 3*d.*

6. Bought 8 bags of cotton, each bag weighing 3*cwt.* 1*qr.* 7*lb.* grofs, tare at 17½*lb.* per bag, what will they come to, at 1*s.* 3½*d.* per *lb.* *anf.* 182*l.* 12*s.* 10*d.*

BILLS *of* PARCELS & BOOK-DEBTS.

Mr Dick, Corn-monger,

To George Farmer, Dr.

1784.	*qr. bush.*	*l.*	*s.*	*d.*		£.	*s.*	*d.*
June 20, To	15 7 of wheat, at	1	10	4	*per qr.*	24	1	6½
July 16, —	20 3½ of oats, -	0	19	10	——	20	5	4
	bush. pe.							
—— 27, —	27 3 of peafe, -	0	4	1½	*p. bu.*	5	14	5½
Aug. 6, —	4 2½ of tares, -	0	2	1¼	——	0	9	8½
—— 19, —	72¼*lb.* of hops, -	0	2	4½	*per lb.*	8	12	9½
						59	3	9¾

The *Right Honourable Earl of M—*

To Robert Jeweller, Dr.

1784.		£.	*s.*	*d.*
May 16,	To a large silver cup, weight 47*oz.* 16*dwts.* at 7*s.* 6*d.* per ounce	17	18	6
May 19,	— a punch-bowl, weight 160*z.* 17*dwts.* 12*grs.* at 6*s.* 10½*d.* p. oz.	5	16	4
June 6,	— 3 dozen silver spoons, wt. 30*oz.* 18*dwts.* at 7*s.* 2*d.* per ounce	11	1	5
—— 23,	— 4 large candlesticks, wt. 51*oz.* 4*dwts.* 6*grs.* at 7*s.* 5*d.* per oz.	18	19	9½

Aug. 17,	— a gold plate, wt. 100*oz.* 14*dwts.* 8*gr.* at 5*l.* 14*s.* 9*d.* per *oz.*	61	9	8½
—	— 10 silver plates, weight 67*oz.* 13*dwts.* at 6*s.* 7*d.* per ounce	22	5	4
		137	11	1¼

Mr John Grocer,

Bought of *Merchant* and Co.

May 18, 1784.	£.	*s.*	*d.*
4 hogſheads of ſugar, weight 43*cwt.* 2*qr.* 16*lb.* at 2*l.* 16*s.* 4*d.* per *cwt.*	122	18	6½
6 cheſts of tea, weight 9*cwt.* 2*qr.* 14*lb.* at 29*l.* 6*s.* per *cwt.*	282	0	3
19 barrels of raiſins, weight 30*cwt.* 1*qr.* 7*lb.* at 1*l.* 19*s.* 10*d.* per *cwt.*	60	7	5¼
7 pockets of hops, weight 32*cwt.* 2*qr.* at 6*l.* 14*s.* 9*d.* per *cwt.*	218	19	4½
Pepper 1*cwt.* 2*qr.* 18*lb.* at 1*s.* 11½*d.* per *lb.*	18	4	3
Cloves 3*qr.* 14*lb.* at 4*s.* 9*d.* per *lb.*	25	5	6
3 hogſheads of tobacco, weight 34*cwt.* 1*qr.* 16*lb.* at 3*l.* 17*s.* 10*d.* per *cwt.*	133	16	10¾
Soap, 4*cwt.* 2*qr.* 19*lb.* at 2*l.* 11*s.* 8*d.* per *cwt.*	12	1	3
	871	13	6

March, 16, 1784.

Mr John Newcaſtle,

Bought of *Robert Cheeſemonger* and Co.

	£.	*s.*	*d.*
10 Cheſhire cheeſes, wt. 3*cwt.* 2*qr.* 17*lb.* at 2*l.* 19*s.* 10*d.* per *cwt.*	10	18	5¼
7 Gloceſter cheeſes, weight 1*cwt.* 3*qr.* 14*lb.* at 1*l.* 15*s.* 6*d.* per *cwt.*	3	6	6¾
12 Suffolk cheeſes, weight 4*cwt.* 16*lb.* at 12*s.* 7½*d.* per *cwt.*	2	12	3½
17 Yorkſhire cheeſes, weight 6*cwt.* 2*qr.* 20*lb.* at 1*l.* 13*s.* 9*d.* per *cwt.*	11	5	4½
13 Firkins of butter, at 1*l.* 12*s.* 6*d.* a firkin,	21	2	6
7 Flitches of bacon, weight 30*ſt.* 12*lb.* at 5*s.* 8*d.* a ſtone	8	14	9¾
	58	0	6¼

Sir Charles Loveliquor, Bought of *John Redport.*

July, 6, 1784.	*s.*	*d.*		£.	*s.*	*d.*
6 dozen of red port, at	18	6	*a dozen.*	5	11	0
14½ gallons of madeira, at	10	9	*a gallon.*	7	15	10½
1 pipe of claret	8	10	——	55	13	0
17 gallons of canary	7	11	——	6	14	7
1½ hogshead of lisbon	9	2	——	43	6	3
6 anchors of brandy	12	4	——	37	0	0
2½ puncheons of rum	7	6	——	78	15	0
				234	15	8½

Mr John Innkeeper, Bought of *George Butcher.*

April 10, 1784.	*ſt.*	*lb.*		*s.*	*d.*		£.	*s.*	*d.*
A leg of mutton, weight	0	14½	at	0	4¼	*per lb.*	0	5	2¼
A fore-chain of pork	0	10½	at	0	4¾	——	0	4	1¾
A sirloin of beef	3	10½	at	3	11	*per ſt.*	0	14	8¼
A hind qr. of veal	0	19	at	0	3¾	*per lb.*	0	5	11¼
A round of beef	4	6	at	0	4	——	1	0	8
Beef-steaks	0	7	at	0	4½	——	0	2	7½
A quarter of lamb	0	12	at	0	6½	——	0	6	6
							2	19	9½

Madam Lovely,

To *Benjamin Canton, Dr.*

1784.	£.	*s.*	*d.*		£.	*s.*	*d.*
Feb. 17, To 4 sets of china, at	2	14	9	each	10	19	0
—— 27, —— 2½ dozen plates	0	4	7	——	6	17	6
Mar. 9, —— 14 coffee cups	0	10	6	*a doz.*	0	12	3
—— 27, —— 6 curious diſhes	0	12	7	*each*	3	15	6
Apr. 9, —— 7 large punch bowls	0	14	10	——	5	3	10
					27	8	1
May 4. By cash in part					17	18	9
				Balance	9	9	4

Newcastle upon Tyne, July 26, 1784.

Mr John Merchant,

Bought of *Johnston & Co.* 7 hogsheads of Jamaica sugar, weighing as under, what will they cost, when 18*lb.* per *cwt.* is allowed for tare, at 4*l.* 1*s.* 6*d.* per neat *cwt.*

	cwt.	*qr.*	*lb.*
No. 1. weighed	6	1	14
— 2. ———	4	3	6
— 3. ———	7	0	18
— 4. ———	8	2	6
— 5. ———	8	1	20
— 6. ———	6	3	26
— 7. ———	9	0	0
	51	1	6 *gross.*
	8	0	27¼ *tare.*
	43	0	6¾ *neat, at* 4*l.* 1*s.* 6*d. per cwt.*

£.	*s.*	*d.*
175	9	4½

Leeds, *Feb.* 14, 1794.

Mr George Andrew,

Bought of Messrs *Lock & Robson.*

pieces.	*yds.*		*s.*	*d.*		*£.*	*s.*	*d.*
6 broad cloth, each	46	at	15	9	*per yd.*	217	7	0
4 narrow	57	at	5	7½	———	64	2	6
2 Scarlet	21	at	19	6	———	40	19	0
7 Flannel	25	at	1	2½	———	10	11	5½
5 Velveteen	17	at	3	6	———	14	17	6
9 Prince's Stuff	16	at	4	2½	———	30	6	0
2 Buckram	9	at	0	8½	———	—	12	9
						378	16	2½

Dublin, *May* 14, 1794.

Mr James Linendraper,

Bought of *Mr John Smith*, 8 pieces of Irish Linen, viz.

	yds.	*qr.*	*na.*		*s.*	*d.*		*£.*	*s.*	*d.*
No. 1.	46	3	2	at	4	9	*per yard.*	11	2	7½
— 2.	17	0	3	at	5	0	———	4	5	11¼
— 3.	29	2	0	at	3	10½	———	5	14	3½
— 4.	50	1	1	at	4	6	———	11	6	4½
— 5.	18	2	1	at	4	3¾	———	4	0	0½
— 6.	30	3	3	at	4	2	———	6	8	10½
— 7.	43	1	2	at	4	8½	———	10	4	2½
— 8.	60	1	1	at	3	7	———	10	16	1¼
								63	18	6½

Lancaster, *March* 16, 1795.

Obadiah Kay, Bought of *Grierson & Co.*

pieces.	*yds.*	*s.*	*d.*		£.	*s.*	*d.*
50 German serge, each	19¼ at	2	1½	*per yd.*	102	5	3¾
24¾ Shalloon	27 at	1	4¾	——	46	12	9
27⅛ Printed cotton	25 at	2	4	——	80	11	5½
61 Camblet	31 at	1	10½	——	177	5	7½
4 Bombazeen	36½ at	3	6½	——	25	17	1
29¾ Scotch linen	24 at	1	6½	——	55	—	9
17 Irish ditto	34 at	2	1	——	60	4	2
					547	17	1¾

London, *January* 16, 1795.

James M'Lean, To *John Clarkson*, *Dr.*

	£.	*s.*	*d.*
Jan. 14. To 17¼ pieces Holland, each 35*yds.* at 2*s.* 7½*d.* per ell *E.*	64	6	3
Mar. 19. To 29¾ pieces of tapestry, each 19¾ *yds.* at 4*s.* 10*d.* per ell *Fl.*	141	19	10½
May 4. To 12 pieces holland, each 29¼ *yds.* at 3*s.* 1*d.* per ell *E.*	44	—	7
June 7. To 14¼ pieces of tapestry, each 21 *yds.* at 3*s.* 2*d.* per ell *Fl.*	63	3	6
Aug. 17. To 21 pieces Irish linen, each 24¼ *yds.* at 2*s.* 11½*d.* per *yd.*	76	17	7
	390	7	9½
Dec. 4. By cash	300	0	0
Balance	90	7	9½

A promiscuous Collection of Questions, to exercise the foregoing Rules.

1. How long would it take to count four hundred millions of guineas, supposing 100 to be counted in a minute, 10 hours per day, and the year to consist of 365 days?

ans. 18*years*, 96*days*, 6*hr.* 40*min.*

2. Sixty hogſheads of beer, London meaſure, were ordered to be put into 30 wine-pipes; but upon trial it was found that the wine-pipes would not hold the beer; how many ale gallons muſt the caſk hold that contains the difference? *anſ.* 143*gal.* $2\frac{112}{231}$*qts.*

3. What is the ſum and difference of ſix dozen of dozens, and half a dozen of dozens? *anſ.* Sum 936. difference 792.

4. A merchant bought 242 yards of broad cloth, for 201*l.* 12*s.* 8*d.* he paid 13*s.* 4*d.* per yard for 86 yards of it; how much did he pay per yard for the reſt? *anſ.* 18*s.* 6*d.*

5. A regiment of ſoldiers, conſiſting of 1000 men, is to have new coats, each 1*yd.* 2*qrs.* of 6 quarters wide, and they are to be lined with ſhalloon that is yard-wide; how many yards will it take to make the coats, and how many to line them?

anſ. 1500*yds.* to make the coats, and 2250*yds.* to line them.

6. A gentleman has a dozen table ſpoons, each 20*oz.* 14*dwt.* three dozen tea-ſpoons, each 14*dwt.* 12*gr.* four cups, each 13*oz.* 17*dwts.* two tankards, each 23*oz.* 13*dwts.* how much is the weight of the whole? *anſ.* 16*lb.* 10*oz.* 12*dwts.*

7. Suppoſe 69333 dozen pair of ſtockings to be purchaſed at 1*l.* 10*s.* per dozen, and the expence of exporting them to different countries to be 2133*l.* 5*s.* 6*d.* required the coſt, and how much would be gained by ſelling them, on an average, at 2*s.* $9\frac{1}{2}$*d.* per pair? *anſ.* coſt 103999*l.* 10*s.* gained 10000*l.*

8. A butcher buys an ox for 10*l.* 16*s.* and after feeding him with 24 pecks of oats, at 18*s.* per quarter, and 20 truſſes of hay, at 1*s.* 4*d.* per truſs, ſlaughters him, and ſells the beef, being 40 ſtones, at $5\frac{1}{2}$*d.* per *lb.* 6 ſtones of tallow, at 7*d.* per *lb.* and the hide for 1*l.* 5*s.* required his gain or loſs?

anſ. 3*l.* 14*s.* 6*d.* gain.

9. An ordinary of 100 men drunk 20*l.* worth of wine, at 2*s.* 6*d.* per bottle; how many men, at the ſame rate of drinking, will 7*l.* ſerve, when wine is 1*s.* 9*d.* per bottle?

anſ. 50 *men.*

10. What will 130 loads of potatoes come to, at 6*s.* 9*d.* per load; and how much will they weigh, each load being 14*ſt.* 9*lb.*

anſ. price 43*l.* 17*s.* 6*d.* weight 11*ton*, 17*cwt.* 3*qr.* 22*lb.*

11. How many ells Engliſh are there in 146 ells Scotch?

anſ. $120\frac{136}{157}$.

12. A ſhip of war, having on board 178 ſeamen, beſides officers, took a prize, whoſe cargo conſiſted of 71 bags of cotton, worth 10*l.* 14*s.* per bag, 40 barrels of ſpicery, worth 50*l.* 19*s.* 6*d.* per barrel, 157 yards of cloth, worth 1*l.* 3*s.* 3*d.* per

yard, and several other articles to the value of 148*l.* 18*s.* 9*d.* what will each man receive, after the officers have deducted one-fifth of the whole for their share? *ans.* 14*l.* 2*s.* $4\frac{1}{2}$*d.*

13. How much will 112 bolls of wheat come to, at 11*s.* 9*d.* per boll, and how much will they weigh, when one boll weighs 9*st.* 7*lb.* *ans.* price 65*l.* 16*s.* weight 6*ton*, 13*cwt.*

14. How many Scotch pints are there in 174 gallons English measure? *ans.* $467\frac{33}{103}$.

15. A person purchased a sloop's cargo of potatoes, at 5*s.* 8*d.* per load; the sloop's burden was 75 tons, and the load weighed 14*st.* 10*lb.* required the price and number of loads?

ans. price 231*l.* 1*s.* 4*d.* $1\frac{10}{20}$*qr.* number of loads $81\frac{110}{200}$.

16. Suppose a person purchase 500 turkies for 125 guineas, and sells 40 of them for 5*s.* 9*d.* each, 60 at 6*s.* 2*d.* 150 at 6*s.* 9*d.* and the remainder, at 7*s.* 6*d.* each, how much would he gain? *ans.* 43*l.* 2*s.* 6*d.*

17. Required the price and weight of 129 quarters of wheat, each weighing 4*cwt.* 2*qr.* 12*lb.* at 1*l.* 10*s.* 4*d.* per quarter?

ans. price 195*l.* 13*s.* weight 29*tons.* 14*cwt.* 1*qr.* 8*lb.*

18. Bought 6 sacks of flour, at 2*l.* 5*s.* per sack; required the price of the whole, and the rate per stone?

ans. price 13*l.* 10*s.* rate per stone 2*s.* 3*d.*

19. Required the tonnage of a ship that carries 110 lasts of wheat, supposing the bushel to weigh $4\frac{3}{4}$ stones; and what will be the price, at 7*s.* 4*d.* per boll?

ans. tonnage $261\frac{1}{4}$, price $1613\frac{1}{2}$*l.* 6*s.* 8*d.*

20. The Roman emperor Albinus had so voracious an appetite, that he sometimes devoured for his breakfast 500 figs, 100 peaches, 10 melons, 20*lb.* of grapes, 100 small birds, and 400 oysters; what would such a breakfast cost, valuing the figs at $2\frac{1}{2}$*d.* the peaches at $5\frac{1}{2}$*d* and the melons at 4*s.* $9\frac{1}{2}$*d.* each, the grapes, at 1*s.* $11\frac{1}{2}$*d.* per *lb.* the birds, at $6\frac{1}{2}$*d.* each, and the oysters at 3 a penny? *ans.* 14*l.* 16*s.* $3\frac{1}{2}$*d.*

21. Suppose four sir-loins of beef to weigh $28\frac{1}{2}$*lb.* $37\frac{1}{2}$*lb.* $45\frac{1}{2}$*lb.* $56\frac{1}{2}$*lb.* and to be purchased at 3*s.* $4\frac{1}{2}$*d.* per stone of 8*lb.* how much would be gained, by selling them at $7\frac{1}{2}$*d.* per *lb.*

ans. 1*l.* 17*s.* $7\frac{1}{2}$*d.*

22. Suppose a sheep, weighing $19\frac{1}{2}$ stones of 8*lb.* was bought of a carcase butcher, at 3*s.* $2\frac{1}{2}$*d.* per stone, and retailed at $5\frac{1}{2}$*d.* per *lb.* what would be gained by the sale? And if the purchaser sold two such sheep every working day throughout the year, what would his gain be at the expiration of that period?

anſ. 11*s.* 9½*d.* gained by one ſheep; and 369*l.* 1*s.* 7*d.* by the annual ſale.

23. Twenty-ſix wedges of gold, weighing in all 34*lb.* 3*oz.* 11*dwts.* 14*grs.* were brought to the mint to be coined into guineas; required the weight of each wedge, admitting them equal, and how many guineas may be made out of the whole, ſuppoſing an ounce of gold will make 3¾ guineas?

anſ. weight of each wedge, 1*lb.* 3*oz.* 16*dwts.* 14$\frac{1}{13}$*grs.* and 1543$\frac{7}{84}$ guineas.

24. In 57 guineas, 33 half-guineas, and 48 moidores, how many pounds? *anſ.* 141*l.* 19*s.* 6*d.*

25. Suppoſe the ſea allowance for the common men to be 5*lb.* of beef, and 3*lb.* of biſcuit per day for a meſs of four people, and that the price of the beef be to the king 2¾*d.* per *lb.* and of the biſcuit 1½*d.* per *lb.* ſuch was the ſhip's company, that their beef coſt the government 12 guineas per day, what did it coſt per week for bread? *anſ.* 35*l.* 5*s.* 7*d.* 0$\frac{3}{11}\frac{2}{11}$*qr.*

26. A perſon laid out 100*l.* upon ſerges and ſhalloons, the value of the ſhalloons was 60*l.* and the quantity of ſerge 236 yards; and for every two yards of ſerge there were three of ſhalloon; how many yards of ſhalloon were there, and what was the value of each per yard? *anſ.* 354*yds.* ſhalloon—Serge 3*s.* 4*d.* 2$\frac{68}{236}$*qrs.* per yard—Shalloon, 3*s.* 4*d.* 2$\frac{2}{3}\frac{2}{4}$*qrs.* per yard.

When it is required to have an equal number of pieces, parcels, &c. in any given quantity—

Add the ſeveral pieces, parcels, &c. into one ſum, bring this ſum and the given quantity to the ſame name; then divide the one by other, and the quotient will be the anſwer.

27. How many pieces of 13½*d.* 12*d.* 9*d.* 6*d.* and 4*d.* and of each an equal number, can be made out of an ingot of ſilver, value 147*l.* 19*s.* 3*d.* *anſ.* 798.

28. How many parcels of 14*lb.* 12*lb.* 8*lb.* 6*lb.* and 2*lb.* can be made out of 4*cwt.* 14*lb.* *anſ.* 11.

29. How many bowls, each 2*lb.* 8*oz.* tankards, each 1*lb.* 6*oz.* ſalts and pepper boxes, each 5*oz.* 5*dwts.* and ſpoons, each 1*oz.* 18*dwts.* and of each an equal number, may be made out of 16 ingots of ſilver, each 2*lb.* 7*oz.* 4*dwts.* *anſ.* 8.

30. How many guineas, crowns, half-crowns, ſhillings, and pence, and of each an equal number, are there in 1999*l.* 16*s.* 8*d.* *anſ.* 1352

31. How many guineas, half-guineas, crowns, half-crowns, shillings, fixpences, and threepences are there in 999998*l.* 17*s.* 9*d.* *anf.* 490797.

32. In 364$\frac{3}{4}$ yards of cambrick, how many handkerchiefs, each $\frac{3}{4}$ of a yard, 1 yard, 1$\frac{1}{4}$ yard, and 1$\frac{1}{2}$ yard, and of each an equal number? *anf.* 81.

33. In 50 pieces of diaper, each containing 20*yds* 2*qr.* how many parcels of 5 ells Engliſh, 6 ells French, and 7 ells Flemiſh, and of each an equal number? *anf.* 50.

34. A butcher goes to Smithfield-market with 116*l.* 14*s.* and buys cattle at the following prices, *viz.* oxen at 10*l.* cows at 7*l.* calves at 1*l.* 10*s.* and ſheep at 19*s.* each, and of each the ſame number; how many of each ſort? *anf.* 6.

35. It is ſaid that 50,000 firkins of butter are yearly ſent to London from Cambridge and Suffolk, ſuppoſing this quantity to be purchaſed at 7$\frac{1}{2}$*d.* per *lb.* and the expence for carrying it 1$\frac{1}{4}$*d.* per *lb.* how much would be gained per cent, and how much upon the whole, if it were ſold at London, at 11*d.* per *lb.*

anf. 25*l.* 14*s.* 3*d.* 1$\frac{1}{4}$*qr.* gain per cent.—26250*l.* gain upon the whole.

36. If 1728 wine glaſſes were bought for 65*l.* 2*s.* how much muſt they be ſold for per dozen to gain 10 guineas on the whole? *anf.* 10*s.* 6*d.*

37. Bought 12 ſacks of flour for 27*l.* how much did they coſt per ſtone, and what muſt they be ſold for to gain 3*l.* upon the whole? *anf.* coſt 2*s.* 3*d.*—muſt be ſold for 2. 6*d.*

38. A merchant bought at Oporto, 46 tons of wine, for 579*l.* 12*s.* the freight coſt 46*l.* the loading and unloading 6*l.* cuſtoms 10*l.* charge of the cellar 4*l.* how much muſt he ſell it per ton to gain 360*l.* by the bargain? *anf.* 21*l.* 17*s.* 2*d.* 2$\frac{20}{48}$*qrs.*

39. Suppoſe a glover ſhould purchaſe 50 dozen of gloves, at 18*s.* 6*d.* per dozen, how muſt he ſell them per pair to gain 20*l.* per cent. *anf.* 1*s.* 10$\frac{1}{2}$*d.*

40. If 50 pieces of flannel, each containing 48*yds*, were purchaſed in London, at 2*s.* 2*d.* per yard, and the ſhipping of them to America coſt 10*l.* 10*s.* beſides 12*l.* per cent for inſurance; how muſt they be ſold per yard to gain 25*l.* per cent?

anf. 3*s.* 1*d.* 2$\frac{204}{480}$*qrs.*

41. A quill merchant bought 20 thouſand quills, at 9*s.* per thouſand, he paid three ſhillings per thouſand for having them dreſſed, and 4*s.* 6*d.* per thouſand for having them made into

pens; how must he sell them per hundred to gain 8*l.* 10*s.*

anf. 2*s.* 6*d.*

42. If 2 hogsheads of perry, wine-measure, were bought for 10*l.* 10*s.* and bottled off into quart bottles, how must they be sold per dozen to gain 3*l.* 13*s.* 6*d.* *anf.* 6*s.* 9*d.*

43. Bought a quantity of cloth, for 412*l.* 10*s.* 85 yards of which being damaged, were sold at 15*s.* per yard, by which means 6*l.* 7*s.* 6*d.* was loft; required the quantity bought, and how much per yard the undamaged part must be sold for to gain 17*l.* 16*s.* 8*d.* upon the whole? *anf.* Quantity bought 500*yds*—17*s.* 8*d.* per yard undamaged part.

44. A contractor agrees to supply a ship (whose crew consists of the captain, 8 officers, and 160 sailors) with provisions, on condition that he receives 15*s.* per month of 28 days, for each sailor, three times as much for each officer, and six times as much for the captain. He provides 35 barrels of beef, at 35*s.* 6*d.*—16 of pork, at 52*s.*—8*ton*, 15½*cwt.* of bread, at 25*s.* per *cwt.*—82 bushels of peas, at 5*s.*—26*cwt.* 2*qr.* 21*lb.* of cheese, at 30*s.*—18*cwt.* 3*qr.* 16*lb.* of butter, at 3*l.* 14*s.* 8*d.*—26½ quarters of meal, at 19*s.* 8*d.*—8*cwt.* of fish, at 26*s.*—and other small charges to the amount of 1*l.* 7*s.* 3½*d.* at the return of the ship he finds his profit to be 185*l.* 15*s.* 5*d.* how long was the voyage? *anf.* 4*months*, 21*days.*

45. The rent of a certain fishery is 360*l.* the tenant of it employs 8 men, at 10*d.* per day, and an overseer at double that sum; the fishermen have also $\frac{1}{7}$ of the fish caught during the season: The fishing continues 249 working days, and they catch, on an average, 250 fish in 8 days, weighing one with another 8*lb.* The expence for boats and nets is 60*l.* the fish are packed in barrels containing 300*lb.* each, price of the barrels 2*s.* 6*d.* a piece, salt 1*s.* 6*d.* per barrel; required how they must be sold per barrel that the tenant may gain one fifth of what they are sold for? *anf.* 4*l.* 3*s.* 10*d.* $2\frac{1}{13}$*qrs.*

46. A privateer, whose crew consisted of the captain, first and second mates, a surgeon, carpenter, 52 sailors, and 42 marines, took a prize worth 31235$\frac{2}{3}$*l.* of which, according to agreement, the proprietors are to have $\frac{2}{3}$; the captain is to have 9 shares; the first mate, surgeon, and carpenter, $6\frac{4}{5}$ shares each; the second mate 5 shares; each sailor $1\frac{1}{4}$ share; each marine $\frac{6}{7}$ of a share; how much will each receive? *anf.* Captain's share, 699*l.* 6*s.*—First mate's, &c. 492*l.* 2*s.*—Second mate's, 388*l.* 6*s.*—Each sailor's 97*l.* 2*s.* 6*d.*—Each marine's 66*l.* 12*s.*

47. A, B, and C, open an account with a banker, 11 Jan. 1797, and put into his hands as follows, viz. A 17*l.* 17*s.* B 34*l.* 11*s.* 6*d.* C 28*l.* 18*s.* 10*d.* on the 21ſt A draws 9*l.* 10*s.* and C advanced 12*l.* 5*s.* the 24th, B called for 6*l.* 10*s.* the 30th, C wanted 19*l.* 8*s.* 4*d.* February the 12th, B depoſited 12*l.* 13*s.* and three moidores; the 19th, A ſent for 5*l.* and a noble; but on the 24th returned 42*l.* March 2d, C paid in 20 guineas, and B drew 6 guineas; the 14th, B ſent in 17*l.* 8*s.* 8*d.* the 17th, A drew 12*l.* 2*s.* 6*d.* on the 19th, they ſent for five guineas each; the 14th, they returned that ſum and 10 marks a piece more; how much did their banker owe them jointly and ſeparately in March 25th? *anſ.* To A 39*l.* 11*s.* 2*d.* to B 62*l.* 11*s.* 6*d.* and to C 49*l.* 8*s.* 10*d.* Jointly 151*l.* 11*s.* 2*d.*

VULGAR FRACTIONS.

DEFINITIONS.

1. A Fraction, or broken number, is one part or more of an integer: and is expreſſed by a number above and another below a line drawn between them; Thus, $\frac{4}{5}$.

The number below the line is called the denominator, becauſe it denominates, or ſhews, into how many parts the integer is divided; and the number above is called the numerator, becauſe it numerates, or ſhews, how many of theſe parts the fraction contains. The numerator and denominator are called the terms of the fraction.

2. There are two kinds of vulgar fractions, ſimple and compound.

3. A ſimple fraction conſiſts of a numerator and a denominator, as $\frac{7}{9}$, and is divided into two ſorts, proper and improper.

4. A proper fraction is when the numerator is leſs than the denominator, as $\frac{5}{7}$.

5. An improper fraction is when the numerator is either equal to, or greater than the denominator, as $\frac{4}{4}$, or $\frac{7}{4}$.

6. A compound fraction conſiſts of two or more fractions joined together by the word of, as, $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$.

7. A mixt number conſiſts of a whole number and a ſimple fraction, as $9\frac{3}{7}$.

When the numerator is equal to the denominator, the fraction, is equal to the integer; thus, $\frac{6}{6}=1$.

And when the numerator is greater than the denominator, the fraction is greater than the integer, as $\frac{4}{3}=1\frac{1}{3}$.

Note, If the numerator and denominator of a fraction be either multiplied or divided by the same number, the product or quotient will be a new fraction, equal in value to the former: Thus, $\frac{4}{12}\div 2=\frac{2}{6}$, or $\frac{4}{12}\times 3=\frac{12}{36}$, all of which have the same value, $\frac{4}{12}=\frac{2}{6}=\frac{12}{36}$.

REDUCTION of VULGAR FRACTIONS.

CASE 1.

To reduce fractions to their least terms.

RULE.—Divide the greater term by the less, and that divisor by the remainder, the next divisor by the next remainder, and so on always dividing the next divisor by the next remainder, till nothing remains; the last divisor is the greatest common measure; by which divide the terms of the fraction for the answer.

Reduce to their least terms.

		anf.			anf.			anf.
1. $\frac{378}{1134}$	=	$\frac{42}{126}$	3. $\frac{316}{940}$	=	$\frac{79}{235}$	5. $\frac{832}{1618}$	=	$\frac{416}{809}$
2. $\frac{267}{1310}$	=	$\frac{89}{437}$	4. $\frac{618}{497}$	=	$\frac{618}{497}$	6. $\frac{330}{485}$	=	$\frac{132}{194}$

CASE 2.

To reduce fractions to less terms.

RULE.—When the terms of the fraction end with 5 or 0, divide by 5; when with an even number or a cypher, divide by 2; when there are cyphers at the end of each, cut off as many as are common to both; and when any number will divide both numerator and denominator, without a remainder, divide them by it.

1. Reduce $\frac{740}{915}$	5. Reduce $\frac{6000}{48000}$	9. Reduce $\frac{1700}{16000}$
2. —— $\frac{840}{1700}$	6. —— $\frac{75}{96}$	10. —— $\frac{478}{836}$
3. —— $\frac{672}{840}$	7. —— $\frac{40}{80}$	11. —— $\frac{180}{1575}$
4. —— $\frac{44}{88}$	8. —— $\frac{125}{25}$	12. —— $\frac{462}{1100}$

CASE 3.

To reduce improper fractions to their proper parts.

RULE.—Divide the numerator by the denominator, the quotient will be the whole number, the remainder, if any, a numerator, to the divisor a denominator: annex this fraction to the whole number.

Reduce to their proper parts.

1. $\frac{74}{10}$ - $3\frac{17}{10}$
2. $\frac{24}{1}$ - 8
3. $\frac{187}{27}$ - $6\frac{25}{27}$
4. $\frac{1748}{17}$ - $102\frac{14}{17}$
5. $\frac{65}{5}$ - 13
6. $\frac{178}{1}$ - $19\frac{7}{9}$
7. $\frac{72}{6}$ - 12
8. $\frac{1486}{117}$ - $12\frac{82}{117}$
9. $\frac{2073}{041}$ - $5\frac{150}{041}$

CASE 4.

To reduce mixt numbers to simple fractions.

RULE.—Multiply the whole number by the denominator, to which add the numerator; this sum placed over the denominator will form the fraction required.

A whole number is reduced to the form of a fraction by putting 1 for its denominator.

Reduce to simple fractions.

		anſ.			anſ.			anſ.
1. 67	-	$\frac{67}{1}$	4. $6\frac{1}{4}$	-	$\frac{25}{4}$	7. $174\frac{3}{18}$	-	$3\frac{115}{18}$
2. $4\frac{6}{9}$	-	$\frac{42}{9}$	5. 7	-	$\frac{7}{1}$	8. $16\frac{4}{19}$	-	$\frac{308}{19}$
3. 19	-	$\frac{19}{1}$	6. $17\frac{3}{4}$	-	$\frac{71}{4}$	9. $319\frac{10}{20}$	-	$8\frac{3110}{20}$

CASE 5.

To reduce a whole number to a fraction of a given denominator.

RULE.—Multiply the whole number by the given denominator, and the product will be the numerator to the same denominator.

1. Reduce 3 to a fraction having 5 for its denominator.

anſ. $\frac{15}{5}$.

2. Reduce 11 to a fraction having 9 for its denominator.

anſ. $\frac{99}{9}$.

3. Reduce 27 to a fraction having 14 for its denominator.

anſ. $\frac{378}{14}$.

Case 6.

To reduce compound fractions to simple ones.

Rule.—Reduce whole or mixt numbers to simple fractions; and if the same number be in both numerator and denominator, omit them, also divide those numerators and denominators which are divisible by one another, or by the same number*; then multiply all the numerators together for a numerator, and all the denominators for a denominator of the simple fraction required.

Reduce to simple fractions.

						ans.							*ans.*
1.	$\frac{1}{6}$	of	$\frac{3}{4}$	of	$\frac{5}{8}$	-	$\frac{5}{64}$	6.	$\frac{1}{3}$	of	$\frac{5}{6}$	of $7\frac{1}{4}$ -	$\frac{145}{72}$
2.	$\frac{2}{3}$	of	$\frac{3}{4}$	of	$\frac{7}{8}$	-	$\frac{7}{16}$	7.	$\frac{4}{6}$	of	$6\frac{3}{5}$	of 8 -	$\frac{176}{5}$
3.	$\frac{4}{9}$	of	$\frac{5}{8}$	of	$\frac{9}{10}$	-	$\frac{1}{4}$	8.	$\frac{2}{3}$	of	$\frac{9}{10}$	of $7\frac{1}{9}$ of 10.	$\frac{128}{3}$
4.	$\frac{5}{8}$	of	$\frac{1}{3}$	of	9	-	$\frac{15}{8}$	9.	$6\frac{4}{8}$	of	$9\frac{3}{12}$	of 12 -	$\frac{1443}{2}$
5.	$\frac{7}{10}$	of	$\frac{6}{9}$	of	$\frac{1}{7}$	of 8 -	$\frac{8}{15}$	10.	$\frac{2}{3}$	of	$\frac{6}{5}$	of $\frac{10}{6}$ of $\frac{7}{8}$	$\frac{7}{6}$

* As the cancelling or abbreviating of numbers is of very great use where multiplication or division of fractions is concerned, the following is given as an example how to proceed in such cases.

$$\text{Let } \frac{\cancel{2}}{3} \times \frac{\cancel{6}}{\cancel{5}} \times \frac{\overset{\cancel{2}}{\cancel{10}}}{\cancel{6}} \times \frac{7}{\underset{\underset{2}{\cancel{4}}}{8}} = \frac{7}{6} = 1\frac{1}{6}$$

Draw a line through the two sixes because they are equal; also draw a line through the 10 and the 5, because they divide one another without a remainder, and set the quotient 2 above the 10; for the same reason draw a line through one of the twos and the 8, and put the quotient 4 below the 8; lastly, draw a line through the remaining 2 and the 4, and put the quotient 2 below the 4; there being now only 7 in the numerator, and 2 and 3 in the denominator; multiply the 2 and 3 together for the denominator, and the answer will be $\frac{7}{6} = 1\frac{1}{6}$.

Case 7.

To reduce fractions of different denominators to others of equal value, that have a common one.

RULE 1.—Reduce them to simple fractions, then multiply each numerator, by all the denominators except its own, for each new numerator, and all the denominators together for a common denominator.

Reduce to a common denominator.

		anſ.	anſ.
1.	$\frac{7}{9}$ & $\frac{2}{4}$		$\frac{28}{36}$ & $\frac{27}{36}$
2.	$\frac{1}{2}$, $\frac{2}{7}$ & $\frac{5}{9}$		$\frac{35}{126}$, $\frac{36}{126}$ & $\frac{70}{126}$
3.	$\frac{6}{7}$, $\frac{1}{4}$ & $\frac{9}{10}$		$\frac{240}{280}$, $\frac{210}{280}$ & $\frac{252}{280}$
4.	$\frac{2}{3}$, $\frac{3}{4}$ & $\frac{9}{8}$		$\frac{64}{96}$, $\frac{24}{96}$ & $\frac{108}{96}$
5.	$\frac{6}{8}$, $\frac{3}{7}$ & 4		$\frac{42}{56}$, $\frac{24}{56}$ & $\frac{224}{56}$
6.	$4\frac{1}{8}$, $\frac{6}{7}$ & $\frac{9}{11}$		$\frac{2941}{616}$, $\frac{528}{616}$ & $\frac{504}{616}$
7.	$6\frac{2}{12}$, $\frac{3}{4}$ of $\frac{1}{3}$ & $\frac{12}{13}$		$\frac{1344}{156}$, $\frac{91}{156}$ & $\frac{144}{156}$
8.	$9, 4\frac{5}{7}, \frac{1}{4}$ of $\frac{2}{3}$ & $\frac{5}{6}$		$\frac{1620}{180}$, $\frac{780}{180}$, $\frac{28}{180}$ & $\frac{150}{180}$
9.	$12\frac{3}{9}, \frac{2}{7}$ of $\frac{5}{8}$ & 11		$\frac{3052}{252}$, $\frac{45}{252}$ & $\frac{2772}{252}$

RULE 2.—When of two fractions the one denominator can divide the other without a remainder, multiply the terms of that which has the leſs denominator by the quotient.

Reduce to a common denominator.

		anſ.			anſ.
1.	$\frac{7}{10}$ & $\frac{3}{5}$	$\frac{7}{10}$ & $\frac{6}{10}$	4.	$\frac{4}{9}$ & 7	$\frac{4}{9}$ & $\frac{63}{9}$
2.	$\frac{7}{12}$ & $\frac{5}{4}$	$\frac{7}{12}$ & $\frac{15}{12}$	5.	$\frac{6}{25}$ & $\frac{12}{5}$	$\frac{6}{25}$ & $\frac{60}{25}$
3.	$\frac{4}{21}$ & $\frac{3}{7}$	$\frac{4}{21}$ & $\frac{9}{21}$	6.	$\frac{1}{9}$ & $\frac{2}{3}$	$\frac{1}{9}$ & $\frac{6}{9}$

CASE 8.

Of two given fractions to find which has the greater value.

RULE.—Multiply each numerator into the other's denominator, and if the products be equal, ſo are the fractions; otherwiſe the numerator of the fraction that has the greater value multiplied by the other's denominator, will give the greater product.

Whether has the greater value.

	anſ.		anſ.		anſ.
1.	$\frac{7}{8}$ or $\frac{105}{120}$	$\frac{7}{8}$	3. $\frac{12}{17}$ or $\frac{11}{16}$	$\frac{12}{17}$	5. $\frac{6}{18}$ or $\frac{4}{12}$ equal
2.	$\frac{14}{17}$ or $\frac{20}{19}$	$\frac{14}{17}$	4. $\frac{11}{19}$ or $\frac{48}{80}$	$\frac{48}{80}$	6. $\frac{120}{144}$ or $\frac{5}{6}$ do.

CASE 9.

To find the value of ſimple fractions of a given integer.

RULE.—When the fraction is a proper one, reduce the numerator to the next inferior name, and divide by the denominator; if any thing remain, reduce and divide in the same manner as far as convenient, or till nothing remains.

What is the value of

1. $\frac{7}{20}$ *£.* — 17*s.* 6*d.*
2. $\frac{2}{17}$ *£.* — 13 4
3. $\frac{3}{4}$ *lb.* — — 9
4. $\frac{7}{9}$ *guinea,* — 16 4*qrs.*
5. $\frac{13}{17}$ *moid.* — 20 7 $3\frac{2}{17}$ *oz. d. grs.*
6. $\frac{6}{7}$ *lb. troy,* — 10 5 $17\frac{1}{7}$
7. $\frac{9}{10}$ *oz. av.* — $14\frac{2}{7}$ *drams,*
8. $\frac{7}{11}$ *cwt.* — 2 15 4 $5\frac{9}{11}$ *qr. lb. oz. dr.*
9. $\frac{107}{412}$ *mile* — 2 *furlongs,* *gal. pts.*
10. $\frac{9}{20}$ *hhd. wine* — 28 $2\frac{4}{5}$ *qr. na.*
11. $\frac{1}{8}$ *yd. cloth-m.* — 2 2
12. $\frac{3}{10}$ *acre,* — 30 *poles.*

RULE 2.—When the fraction is an improper one, divide the numerator by the denominator, the quotient will have the same name as the integer; then reduce the remainder, if any, and divide as in Rule 1.

£. s. d. qr.

1. $\frac{106}{117}$ *£.* — 6 4 8 $1\frac{15}{117}$
2. $\frac{188}{4}$ *cwt.* — 47*cwt.* *yds. qrs. na.*
3. $\frac{39}{8}$ *yd. cloth-m.* 4 3 2
4. $\frac{317}{14}$ *lb.* — *s. d. qrs.* 22 7 $2\frac{6}{7}$ *days, hours,*
5. $\frac{379}{3}$ *day,* — 126 8
6. $6\frac{18}{1}$ *oz. av.*—12*lb.* 14*oz.*

CASE 10.

To reduce money, weights, and measures to fractions of a given integer.

RULE.—Reduce the given quantity to its lowest name for a numerator, and the proposed integer to the same name for a denominator.

Reduce

s. d.

1. 17 4 to the fraction of a *£.* *anf.* $\frac{21}{25}$ *£.*
2. 4 $7\frac{1}{2}$ — *pound.* — $\frac{37}{200}$ *£.*
3. — $11\frac{1}{4}$ — *guinea.* — $\frac{47}{1008}$ *gui.*
4. — $9\frac{1}{4}$ — *shilling.* — $\frac{37}{48}$ *sh.*
5. 5 6 — *moidore.* — $\frac{11}{34}$ *moid.*
6. 4oz. 13*dwts.* *lb. troy.* — $\frac{31}{80}$ *lb.*

7.	2qr. 14lb.	to the fraction of a	cwt.	——	$\frac{1}{8}$cwt.
8.	2qr. 3na.	—	yard.	——	$\frac{11}{16}$yard.
9.	2yd. 1qr.	—	ell. E.	——	$\frac{9}{16}$ell. E.
10.	2qr. 13lb.	—	cwt.	——	$\frac{69}{112}$cwt.

CASE II.

To reduce fractions of one integer to equal fractions of another.

RULE—When there is a certain number of the less integer contained in one of the greater, multiply the numerator by that number, when to a less integer, and the denominator when to a greater.

When there is not a certain number of the less integer contained in one of the greater, bring the given fraction to such an integer whereof a certain number is contained in the integer to which the fraction is to be brought; then by the first part of the rule bring this to the fraction required.

Reduce

1.	$\frac{2}{3}$l.	to the fraction of a	sh.	anf.	$\frac{40}{3}$s.
2.	$\frac{7}{8}$s.	—	guinea.	——	$\frac{1}{24}$gui.
3.	$\frac{1}{8}$l.	—	crown.	——	$\frac{1}{5}$crown.
4.	$\frac{9}{10}$sh.	—	sixpence.	——	$\frac{9}{5}$six-p.
5.	$\frac{4}{7}$moid.	—	shilling.	——	$\frac{208}{7}$sh.
6.	$\frac{6}{11}$cwt.	—	lb.	——	$\frac{672}{11}$lb.
7.	$\frac{3}{8}$E. E.	—	nail.	——	$\frac{15}{2}$nail.
8.	$\frac{1}{3}$sh.	—	guinea.	——	$\frac{1}{315}$gui.
9.	$\frac{8}{9}$sh.	—	half-a-crown	——	$\frac{16}{45}$half-cr.
10.	$\frac{3}{4}$E. E.	—	yard.	——	$\frac{15}{16}$yd.
11.	$\frac{1}{7}$l.	—	guinea.	——	$\frac{20}{147}$gui.
12.	$\frac{9}{11}$half-a-gui.	—	shilling.	——	$\frac{189}{22}$sh.
13.	$\frac{2}{3}$ of 6s. 8d.	—	pound.	——	$\frac{2}{9}$l.
14.	$\frac{2}{7}$anchor,	—	hhd.	——	$\frac{20}{441}$hhd.
15.	$\frac{1}{7}$ of 9d.	—	3 sh.	——	$\frac{3}{28}$three-sh.
16.	$\frac{10}{11}$moid.	—	pound.	——	$\frac{270}{20}$l.
17.	$\frac{4}{50}$groat,	—	six-pence,	——	$\frac{8}{15}$six-p.
18.	$\frac{6}{7}$six-p.	—	half a guinea,	——	$\frac{2}{42}$half-gui.

ADDITION OF VULGAR FRACTIONS.

RULE.—Reduce the given fractions to ſimple ones, to the ſame integer and denominator, then place the ſum of the numerators over the common denominator for the fraction required; which if an improper one, reduce to its proper parts, or if of a given integer find its value.

What is the ſum of

1. $\frac{3}{7}$ & $\frac{2}{7}$ *anſ.* $\frac{5}{7}$
2. $\frac{1}{9}$, $\frac{7}{9}$ & $\frac{8}{9}$ — $\frac{16}{9}=1\frac{7}{9}$
3. $\frac{3}{4}$, $\frac{5}{8}$ & $\frac{7}{8}$ — $\frac{20}{8}=2\frac{1}{2}\frac{1}{4}$
4. $\frac{4}{7}$, $\frac{3}{4}$, $\frac{1}{6}$ & $\frac{4}{9}$. $\frac{487}{252}=1\frac{235}{252}$
5. $\frac{1}{2}$, $\frac{2}{3}$ & 5. — *anſ.* $\frac{37}{6}=6\frac{1}{6}$.
6. $6\frac{1}{7}$, $\frac{1}{4}$ & $\frac{1}{2}$ — $\frac{193}{28}=6\frac{25}{28}$.
7. $\frac{2}{3}$ of $\frac{3}{4}$ & $7\frac{1}{4}$ — $\frac{31}{4}=7\frac{3}{4}$.
8. $1\frac{4}{9}$, $\frac{1}{4}$ of $\frac{5}{8}$ & 11. — $\frac{1649}{288}=12\frac{113}{288}$.
9. $\frac{2}{7}$ of $1\frac{6}{7}$, $8\frac{1}{7}$ & $\frac{3}{4}$ of $\frac{1}{4}$ — $\frac{707}{84}=9\frac{41}{84}$.
10. $\frac{4}{7}$ of a ſhilling, & $\frac{3}{11}$ of a penny — $\frac{549}{77}d.=7\frac{20}{77}d.$
11. $\frac{1}{8}$ of a guinea, and $\frac{9}{10}$ of a £. — $\frac{21}{4}s.=1l.\ 8s.\ 6d.$
12. $\frac{11}{14}$£. $\frac{6}{7}$*gui.* & $\frac{5}{6}s.$ — $\frac{145}{42}s.=1l.\ 14s.\ 6d.\ 2\frac{2}{7}qrs.$
13. $\frac{3}{4}$ of $\frac{9}{10}$ of a £, and $7\frac{1}{18}d.$ — $\frac{3043}{420}l.=14s.\ 1\frac{1}{18}d.$
14. $\frac{1}{8}$ of a *cwt.* and $\frac{3}{4}$ of a *lb.* — $\frac{395}{4}lb.=3qr.\ 14lb.\ 12oz.$
15. $\frac{1}{3}$ of $\frac{3}{4}$ of a *yd.* and $7\frac{1}{8}$ of a *na.* — $\frac{121}{8}na.=3qr.\ 3\frac{1}{8}na.$
16. $1\frac{7}{8}$*hour*, $\frac{1}{7}$ of $3\frac{1}{5}$*days*, & $\frac{1}{2}$ of 7 *min.* — $\frac{271}{21}h.=12h.\ 54\frac{2}{7}m.$

Note. When mixt numbers of the ſame integer are to be added; firſt add the fractions and then the whole numbers.

1. Add $3\frac{1}{2}$, $4\frac{1}{3}$ & $10\frac{3}{8}$ together.

$\frac{1}{2}$, $\frac{1}{3}$, & $\frac{3}{8}$

$1\times3\times8=24$

$1\times2\times8=16$

$3\times3\times2=18$

58

$\frac{58}{24}=\frac{20}{24}=1\frac{5}{24}$

$2+3\times8=48$

3
4
10

17 whole numbers.
$1\frac{5}{24}$ fractions,

$18\frac{5}{24}$ anſwer

2. Add $7\frac{2}{3}$, $9\frac{4}{5}$ & $6\frac{7}{10}$ together.

$\frac{2}{3}$, $\frac{4}{5}$ & $\frac{7}{10}$	7
$2\times5\times10=100$	9
$4\times3\times10=120$	6
$7\times5\times3=105$	—
	22 whole numbers.
325	$2\frac{1}{6}$ fractions
$=\frac{65}{30}=\frac{13}{6}=2\frac{1}{6}$	
$3\times5\times10=150$	$24\frac{1}{6}$ answer.

3. Add $2\frac{3}{4}$, $6\frac{1}{7}$, $5\frac{3}{10}$ & $7\frac{3}{5}$ together. *ans.* $21\frac{83}{140}$.
4. Add $12\frac{1}{4}$, $\frac{7}{8}$ & $6\frac{2}{3}$ together. — $19\frac{19}{24}$.

SUBTRACTION *of* VULGAR FRACTIONS.

RULE.—Reduce the fractions as in addition; then place the difference of the numerators, over the common denominator, for the fraction required.

What is the difference between

1. $\frac{8}{9}$ & $\frac{1}{9}$ *ans.* $\frac{7}{9}$.
2. $\frac{8}{9}$ & $\frac{4}{7}$ — $\frac{20}{63}$.
3. $\frac{9}{10}$ & $\frac{2}{5}$ *ans.* $\frac{1}{2}$.
4. 7 & $\frac{2}{3}$ of $\frac{3}{4}$ — $\frac{13}{2}=6\frac{1}{2}$.
5. $4\frac{1}{7}$ & $\frac{1}{2}$ of $\frac{7}{8}$ *ans.* $\frac{415}{112}=3\frac{79}{112}$.
6. $4\frac{1}{10}$ & $\frac{2}{3}$ of $1\frac{1}{9}$ — $\frac{907}{270}=3\frac{97}{270}$.
7. $\frac{4}{9}$ of 7 & $\frac{1}{11}$ of $3\frac{2}{7}$ — $\frac{1949}{693}=2\frac{563}{693}$.
8. $\frac{1}{2}$ of $\frac{3}{4}$ of $6\frac{1}{7}$ & $\frac{3}{4}$ of $4\frac{1}{9}$ of 7 — $\frac{3239}{168}=19\frac{47}{168}$.
9. $\frac{2}{7}$ of a £. & $\frac{3}{4}$ of a shilling. — $\frac{139}{28}s.=4s.\ 11d.\ 2\frac{2}{7}qr.$

		s.	*d.*	*qrs.*
10. $\frac{6}{7}$ of a guinea & $\frac{11}{9}$ of a penny	$\frac{1933}{9}d.=$	17	10	$3\frac{1}{9}$.
11. $\frac{1}{2}$ of $\frac{6}{9}$ of a £. and 6*d.* —	$\frac{37}{6}s.=$	6*s.*	2*d.*	
12. $4\frac{1}{7}$ moidores, & $\frac{2}{7}$ of 9 pounds —	$\frac{423}{7}s.=$	60*s.*	$5\frac{1}{7}d.$	

		cwt.	*qr.*	*lb.*	*oz.*
13. $1\frac{3}{4}$*cwt.* & $9\frac{4}{7}$ of 11*oz.* —	$\frac{21215}{1254}$*cwt.*=	1	2	21	$6\frac{5}{7}$.

Note. When mixt numbers of the same integer are to be subtracted, reduce the fractions to a common denominator, then take the fraction from the fraction, and the whole number from the whole number: If the numerator of the fraction to be subtracted be greater than the other, take it from the denominator, and to that difference add the other numerator, for the required numerator; remembering in this case to carry 1 to the units' place.

1. From $6\frac{7}{8}$ take $2\frac{3}{5}$
$\frac{7}{8}$ & $\frac{3}{5}$ = $\frac{35}{40}$ & $\frac{24}{40}$
6 $\frac{35}{40}$
2 $\frac{24}{40}$
4 $\frac{11}{40}$ *anf.*

2. From $10\frac{6}{7}$ take $8\frac{8}{9}$
$\frac{6}{7}$ & $\frac{8}{9}$ = $\frac{54}{63}$ & $\frac{56}{63}$
10 $\frac{54}{63}$
8 $\frac{56}{63}$
1 $\frac{61}{63}$ *anf.*

3. From $19\frac{4}{11}$ take $17\frac{5}{10}$ *anf.* $1\frac{35}{110}$.
4. From $108\frac{3}{4}$ take $92\frac{5}{8}$ — $15\frac{1}{8}$.

MULTIPLICATION *of* VULGAR FRACTIONS.

THIS Rule is the same, word for word, as that to reduce compound fractions to simple ones.

What is the product of

1. $\frac{3}{4}$ & $\frac{4}{6}$ *anf.* $\frac{6}{8}$.
2. $\frac{7}{8}$ of $\frac{1}{4}$ & $\frac{8}{9}$ $\frac{7}{126}$.
3. $7\frac{1}{4}$ & $\frac{90}{10}$ of $\frac{4}{7}$ of 10 $37\frac{2}{7}$.
4. $\frac{2}{3}$ of $7\frac{1}{8}$ & $\frac{2}{7}$ of $\frac{7}{8}$ of $1\frac{1}{2}$ $1\frac{2}{12}$.
5. 5 & $\frac{6}{12}$ of $\frac{12}{4}$ $\frac{12}{2}=5\frac{2}{2}$.
6. $\frac{5}{3}$ of $\frac{2}{3}$ of $\frac{3}{4}$ & $1\frac{1}{7}$ of $3\frac{3}{7}$ of 11 $6\frac{74}{101}$.

DIVISION *of* VULGAR FRACTIONS.

RULE.—Reduce the given fractions to simple ones, then if the terms of the divisor will exactly divide the terms of the dividend, their quotient will be the answer; but if not, multiply the dividend by the divisor inverted.

Note. $\frac{4}{4}$ inverted becomes $\frac{4}{3}$; $\frac{2}{7}$ inverted becomes $\frac{7}{2}$; and $\frac{90}{10}$ becomes $\frac{10}{9}$.

What is the quotient of

1. $\frac{90}{10}$ by $\frac{3}{2}$ *anf.* $\frac{3}{2}=1\frac{1}{2}$
2. $\frac{2}{3}$ by $\frac{8}{9}$ — $\frac{18}{24}$
3. $\frac{6}{7}$ by $\frac{90}{10}$ — $\frac{22}{27}=1\frac{1}{27}$
4. $\frac{8}{12}$ by $\frac{4}{7}$ — $\frac{2}{2}=1$
5. $\frac{5}{6}$ by $\frac{3}{4}$ — $\frac{32}{24}=1\frac{11}{24}$
6. $\frac{90}{10}$ by $\frac{25}{4}$ *anf.* $\frac{36}{22}$
7. $\frac{2}{3}$ by 4 — $\frac{1}{6}$
8. 9 by $\frac{6}{7}$ — $\frac{21}{2}=10\frac{1}{2}$
9. $4\frac{1}{2}$ by $\frac{3}{8}$ — $\frac{261}{24}=18\frac{9}{24}$
10. $\frac{2}{3}$ of $\frac{3}{4}$ by $4\frac{1}{2}$ — $\frac{3}{24}$
11. $\frac{1}{3}$ of $3\frac{2}{7}$ by $\frac{6}{11}$ of 10 *anf.* $\frac{132}{330}$
12. $\frac{2}{3}$ of $\frac{1}{7}$ of 9 by $\frac{2}{3}$ of $\frac{6}{7}$ of 3 — 3.

RULE *of* THREE *in* VULGAR FRACTIONS.

RULE.—State the queſtion and find the diviſor, as in the Rule of Three of whole numbers. Reduce each term to a ſimple fraction, and the firſt and laſt to the ſame integer. Then multiply the diviſor inverted by the other two terms, and the product will be the anſwer of the ſame integer as the middle term.

1. If $\frac{3}{4}$ of a *lb.* coſt $\frac{1}{12}$ of a *ſhilling*, what will $\frac{13}{16}$ of a *lb.* come to? *anſ.* $7\frac{1}{2}\frac{1}{3}qrs.$

2. If $\frac{7}{8}$ of a yard coſt 12*s.* 9*d.* how much will $2\frac{6}{8}$ yards come to? *anſ.* 1*l.* 13*s.* 3*d.*

3. If $\frac{3}{4}$ of a *lb.* coſt 5*s.* 6*d.* what will $42\frac{3}{8}lb.$ of the ſame coſt? *anſ.* 15*l.* 10*s.* 9*d.*

4. If $6\frac{1}{2}$ yards coſt 18*s.* what will $9\frac{1}{4}$ yards come to? *anſ.* 1*l.* 5*s* 7*d* $1\frac{7}{13}qr.$

5. What will be the price of $7\frac{1}{2}cwt.$ of raw ſugar, when $\frac{9}{10}$ of a *cwt.* coſt 14*s.* 4*d.* *anſ.* 5*l.* 19*s.* 5*d.* $1\frac{1}{3}qr.$

6. If $2\frac{7}{8}$ yards, which is $1\frac{3}{4}$ yard broad, will make a ſuit of clothes; how many yards will it take of $1\frac{1}{8}yd$ breadth? *anſ.* $4\frac{17}{36}yds.$

7. Suppoſe $\frac{2}{3}$ of $\frac{3}{4}$ of a *lb.* coſt 6*s.* $9\frac{1}{2}d.$ what coſt 1 *cwt.* *anſ.* 76*l.* 1*s.* 4*d.*

8. How many buſhels of wheat, at 7*s.* 6*d.* per buſhel, muſt be given for $17\frac{9}{10}$ buſhels, at 5*s.* 4*d.* per buſhel? *anſ.* $12\frac{16}{25}\frac{4}{5}buſh.$

9 What is the value of 1*lb.* 4*oz.* 17*dwts.* of gold, at $4\frac{2}{7}l.$ per ounce? *anſ.* 7*2l.* 4*s.* 3*d.* $1\frac{1}{7}qr.$

10. What will $\frac{17}{19}$ of a *cwt.* coſt, at 10*l.* 4*s.* 9*d.* per fother of $19\frac{1}{2}cwt.$ *anſ.* 9*s.* 4*l.* $2\frac{18}{19}qrs.$

11. If 27 men can do a piece of work in $7\frac{1}{3}$ days, how many days would 13 men take to do the ſame? *anſ.* $15\frac{3}{13}$ *days.*

12. What comes $\frac{7}{10}$ of $\frac{3}{7}$ of a ton of wine to, when $1\frac{1}{2}$ hogſhead coſt $45\frac{9}{10}l.$ *anſ.* 22*l.* 19*s.*

13. If $3\frac{1}{7}lb.$ of gold be worth $100\frac{1}{2}l.$ what is a pennyweight worth? *anſ.* 2*s.* 5*d.* $1\frac{5}{48}qr.$

14 How much bank-ſtock can be bought for 500*l.* at $101\frac{1}{2}l.$ ſterling per cent? *anſ.* 494*l.* 8*s.* $9\frac{15}{101}d.$

15. Suppose I have $\frac{7}{8}$ of a ship, and that I sell $\frac{3}{4}$ of my share for 300*l.* 17*s.* 6*d.* what is the value of the ship?
anf. 458*l.* 9*s.* 6*d.* $1\frac{1}{7}$*qr.*

16. If a person sell $\frac{2}{7}$ of $\frac{3}{4}$ of a ship for 314*l.* 17*s.* 9*d.* what is the value of the ship? *anf.* 1469*l.* 9*s.* 6*d.*

17. Suppose $\frac{7}{13}$ of a ship be worth 514*l.* 19*s.* 6*d.* how much will $\frac{1}{2}$ of $\frac{3}{4}$ of her be worth? *anf.* 358*l.* 12*s.* 10*d.* $1\frac{4}{7}$*qr.*

18. If $\frac{1}{2}$ of $\frac{2}{4}$ of a ship be worth 358*l.* 12*s.* 10*d.* $1\frac{4}{7}$*qr.* what part of her can be bought for 514*l.* 19*s.* 6*d.* *anf.* $\frac{7}{13}$.

19. If a person take $\frac{2}{7}$ of $10\frac{1}{2}$ days to travel a journey of $207\frac{1}{8}$ miles; how many days will he take to travel $674\frac{8}{10}$ miles?
anf. $22\frac{8}{11}\frac{2}{8}\frac{6}{5}$*days.*

20. If I pay a certain sum for the carriage of $10\frac{7}{8}$ *cwt.* $\frac{7}{8}$ of $4\frac{1}{7}$ miles; how far may I have $20\frac{1}{7}$*cwt.* carried for the same money? *anf.* $1\frac{1}{1}\frac{8}{9}\frac{8}{5}\frac{4}{2}\frac{7}{0}$*mile.*

The RULE OF FIVE *in* VULGAR FRACTIONS.

RULE.—State the question and find the two divisors, as in the Rule of Five of whole numbers. Bring each term to a simple fraction; the first and last, as also the second and fourth, to the same integer; then multiply the divisors inverted by the other three terms, and the product will be the answer of the same integer as the middle term.

1. If 2 men mow $\frac{3}{4}$ of an acre in $\frac{2}{3}$ of a day; how many acres will 6 men mow in $3\frac{1}{7}$ days? *anf.* $11\frac{1}{4}$*acres.*

2. If 4 men can finish $12\frac{3}{4}$ rods of ditching in $3\frac{1}{4}$ days, how many rods can 18 men do in $14\frac{8}{7}$ days? *anf.* $256\frac{1}{2}$*rods.*

3. If when wheat is $5\frac{1}{4}$ shillings per bushel, the sixpenny loaf weigh $5\frac{1}{8}$*lb.* how much must be paid for $52\frac{1}{4}$*lb.* when wheat is $8\frac{1}{2}$*s.* per bushel? *anf.* 7*s.* 6*d.* $1\frac{6}{9}\frac{6}{4}\frac{5}{2}$*qr.*

4. If 264 men, in $5\frac{3}{4}$ days of $11\frac{1}{4}$ hours long, do a piece of work, in how many days of $9\frac{1}{2}$ hours long, will 30 men do the same? *anf.* $59\frac{3}{1}\frac{5}{8}$*days.*

5. What is the interest of 873*l.* 17*s.* $11\frac{1}{4}$*d.* for $7\frac{6}{7}$ weeks, at $4\frac{7}{8}$*l.* per cent per annum? *anf.* 6*l.* 8*s.* 8*d.* $3\frac{4}{1}\frac{0}{8}\frac{7}{2}\frac{2}{4}\frac{9}{6}$*qrs.*

6. If a regiment of soldiers, consisting of 975 men, make use of $17\frac{3}{4}$ quarters of wheat in $\frac{1}{7\frac{1}{8}}$ of a month; how many soldiers will 71 quarters serve $2\frac{1}{7\frac{1}{9}}$ months? *anf.* 50.

7. What principal will gain 494*l.* $9\frac{1}{40}$*s.* in $10\frac{9}{10}$ years, at $4\frac{3}{4}$*l.* per cent per annum? *anſ.* 955*l.*

Queſtions to exerciſe Vulgar Fractions.

1. Whether has $\frac{9}{8}\frac{9}{3}$ or $\frac{2}{3}\frac{2}{0}\frac{5}{7}\frac{5}{5}$ the greater value?

2. Reduce $6\frac{2}{9}$ of $7\frac{1}{8}$ of ſixpence to the fraction of ten ſhillings. *anſ.* $\frac{1}{0}\frac{3}{0}\frac{3}{0}$.

3. What is the value of $\frac{1}{1}\frac{1}{8}$ of 71*gui.* 14*s.* 9*d.*
anſ. 3*gui.* 20*s.* 7*d.* $3\frac{1}{3}$*qrs.*

4. Suppoſe I buy $\frac{1}{8}$ of a lottery ticket, and ſell $\frac{3}{4}$ of my ſhare; what part have I left? *anſ.* $\frac{1}{3}\frac{1}{2}$.

5. Bought $\frac{7}{8}$ of a ſhip at one time, and $\frac{1}{1}\frac{1}{0}$ of her at another, and I am now determined to buy all the ſhip; required how much I have to pay for? *anſ.* $\frac{1}{1}\frac{1}{0}$.

6. If the quotient of a diviſion be $\frac{7}{8}$, the diviſor 3 of $9\frac{1}{7}$, and the remainder $\frac{1}{7}$, what is the dividend? *anſ.* $24\frac{3}{7}$.

7. What number divided by $3\frac{1}{4}$ of 7, will give 20? *anſ.* 455.

8. If $\frac{2}{3}$ of $\frac{7}{1}\frac{7}{8}$ of an eſtate be worth 107*l.* 10*s.* required the value of the whole? *anſ.* 414*l.* 12*s.* 10*d.* $1\frac{1}{7}$*qr.*

9. Four threes may be ſo placed as to make 34; how is that done? *anſ.* $33\frac{1}{3}=34$.

10. If $\frac{2}{3}$ of a valuable colliery belong to one gentleman, $\frac{1}{4}$ of it to another, and $\frac{1}{1}\frac{1}{2}$, whoſe value is 1000*l.* to another; required the value of the whole colliery, together with what the firſt and ſecond gentlemen's ſhares are worth? *anſ.* The firſt gentleman's ſhare is worth 8000*l.* the ſecond's 3000*l.* and the value of the whole colliery is 12000*l.*

11. A perſon left $\frac{2}{3}$ of his eſtate to his eldeſt ſon, $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$ to his other ſon, and the reſt to his relations; the eldeſt ſon's ſhare was worth $607\frac{9}{10}$*l.* what was the value of the eſtate, and what did the youngeſt ſon, and relations receive?

anſ. 911*l.* 17*s.* the value of the whole eſtate; the youngeſt ſon got 227*l.* 19*s.* 3*d.* and the relations 75*l.* 19*s.* 9*d.*

12. If $1\frac{1}{2}$ herring coſt $1\frac{1}{2}$*d.* how many can I buy for 11*d.*
anſ. 11.

13. What number is that, to which, if you add $\frac{1}{3}$ of $7\frac{1}{1}\frac{1}{8}$ the ſum will be 10? *anſ.* $7\frac{3}{3}\frac{5}{4}$.

14. If the product of a multiplication be $\frac{7}{1}\frac{7}{0}$, and the multiplicand $\frac{3}{4}$ of $6\frac{1}{7}$; what is the multiplier? *anſ.* $\frac{4}{1}\frac{9}{1}\frac{9}{0}$.

15. Suppose M has $\frac{2}{3}$ of a ship, and sells to N $\frac{3}{4}$ of his share, and that N sells O $\frac{1}{2}$ of his part; what share has O of the ship, and what part has M and N left?

anf. O has $\frac{1}{4}$, M has left $\frac{1}{6}$, and N $\frac{1}{4}$.

16. How many yards of paper, that is $1\frac{9}{10}$ foot broad, will hang a room which is $59\frac{2}{3}$ feet long, $12\frac{2}{3}$ feet broad, and $13\frac{1}{6}$ feet high? *anf.* $334\frac{88}{171}$ *yds.*

17. How many moidores will purchase $100\frac{7}{8}$ yards, at 4*l.* 17*s.* for $37\frac{1}{3}$ ells Flemish? *anf.* 12*m.* 22*s.* $4\frac{46}{171}$*d.*

18. A gentleman left an estate to his three sons; the eldest got $\frac{2}{3}$ of $\frac{7}{8}$ of it, the second got $\frac{3}{4}$ of $\frac{2}{7}$, and the third $1007\frac{9}{10}$*l.* what was the value of the whole estate, and how much did the first and second sons receive?

anf. 8639*l.* 2*s.* 10*d* $1\frac{1}{7}$*qr.* value of the estate: the first son received 5039*l.* 10*s.* and the second 1591*l.* 14*s.* 10*d.* $1\frac{1}{7}$*qr.*

19. There is a cistern which holds 110 gallons of water, it has four cocks, the largest of which can empty it in $1\frac{1}{2}$ hour, the second in $1\frac{7}{8}$ hour, the third in $2\frac{1}{9}$ hours, and the fourth in $2\frac{1}{4}$ hours; required how long they will be in emptying it, when they are all set open together? *anf.* 28*min.* $56\frac{8}{10}$*sec.*

20. Place 4 nines in such a manner as to be equal to 100.

anf. $99\frac{9}{9}=100$.

DECIMAL FRACTIONS.

DEFINITIONS.

1. A DECIMAL fraction has always a unit, with one cipher or more for its denominator: as $\frac{7}{10}$, $\frac{76}{100}$, $\frac{84}{100}$.

2. The numerator only in decimals is expressed; the denominator being always 1 with as many ciphers as there are figures in the numerator.

3. Decimals are distinguished from whole numbers by a point on the left of them; thus ·5 stands for $\frac{5}{10}$, ·75 for $\frac{75}{100}$, ·125 for $\frac{125}{1000}$, and ·4276 for $\frac{4276}{10000}$.

4. A mixt number is when there are figures both on the right and left of the point; those on the left are whole numbers, and on the right decimals; thus, 7·42, 61·14, 100·72.

5. Ciphers on the right of decimals do not alter their value, but being placed on the left of them, with a point prefixed, decrease their value in a tenfold proportion.

6. A finite decimal has a certain number of places.

7. A repeating, or circulating decimal is when one or more figures are continually repeated.

8. A ſingle repeater is when one figure continually repeats; as, ·666, ·3333.

9. A compound repeater is when two or more figures continually repeat; as, ·617617617, ·424242, ·714714.

Note. If a vulgar fraction can be reduced to a decimal fraction without a remainder, the decimal is called finite; if not, the decimal is called infinite, or a repeater.

The Notation of Decimals will appear from the following

TABLE.

7	1	4	6	2	.	3	4	7	4
Tens of thouſands	Thouſands	Hundreds	Tens	Units		Tenth parts	Hundredth parts	Thouſandth parts	Ten thouſandth parts

From the table it appears that decimals decreaſe in the ſame proportion towards the right hand, as whole numbers increaſe towards the left.

To expreſs any decimal in words.

RULE.—Put 1 with as many ciphers as there are figures in the decimal for a denominator; then expreſs in words what that fraction is, which will be the value of the decimal.

Expreſs in words ·74—·007—·176—·0078—·81—·00761—·001073—·617—·00721—·10703—·0007014—·016.

To expreſs any decimal fraction in figures.

RULE.—Expreſs it in the form of a vulgar fraction; then if the numerator conſiſt of as many places as there are ciphers in the denominator, ſet it down with a point on the left of it. But if the numerator have not a ſufficient number of places, ciphers, with a point on the left of them, muſt be prefixed to ſupply the defect.

Expreſs in figures three tenths—Five tenths—Twenty five hundredth parts—Seventy five hundredth parts—Five hundredth parts—Sixty ſeven thouſandth parts—One hundred and forty nine hundred thouſandth parts—Twenty nine ten thouſandth parts—Two thouſandth parts—One hundred and four thouſandth parts—Seventeen hundredth parts—Ninety five millionth parts—One thouſand three hundred and four ten millionth parts.

ADDITION AND SUBTRACTION *of* DECIMALS.

To add or ſubtract finite decimals.

RULE.—Place down the numbers in ſuch a manner that tenths may be under tenths, hundredths under hundredths, &c. in which order the decimal points will ſtand directly under each other; then add or ſubtract as in whole numbers, and put a point in the ſum or difference ſtraight under the other points.

1. Required the ſum of ·253, ·725, ·80761, ·43, ·7615, ·41764, ·0821, and ·oc6.
2. What is the ſum of ·142, ·4, ·10765, ·00714, ·27, ·1754, ·10072, ·167238, and ·14800543.
3. What is the ſum of 6·72, 14·4, ·1728, 16·704, 146·0724, 1976·217, 1007·2, and ·1748?
4. Required the ſum of 1·75, ·4867, 27·615, ·7214, ·6724, 149·8, 74·6724, 971·614, ·718053, and 1007.
5. What is the ſum of ·0061, 34, ·06, 174·55, ·2764, ·071, 4865·5786, 1076·07186, and 178·376.
6. What is the ſum of eighteen hundredth parts—Seven hundred and forty five hundred thouſandth parts—Nine thouſandth parts—Forty three millionth parts—Five hundred and eight thouſandth parts—One hundred and thirty two thouſandth parts—One thouſand and forty four ten millionth parts—Twenty five hundredth parts—Five tenths—and ſix hundred and five thouſandth parts?

EXAMPLES *in* SUBTRACTION.

1. What is the difference between 71·286, and 8·437?
2. What is the difference between 786, and 2·9768?

3. Required the difference between 10, and ·89761?
4. Required the difference between 81·76, and ·008176.
5. What is the difference between seven hundred and fifty five thousandth parts—and ninety nine ten thousandth parts.

To add single repeaters.

RULE.—Repeat the circulates till their right hand figures ſtand under each other; if there be a finite decimal in the queſtion conſiſting of more figures than the circulates, repeat the circulates till they have one place more than it, then for every nine in the right hand column carry 1 to the next, and proceed with the reſt as in addition of finite decimals: the right hand figure in the ſum will be a repeater.

Note. A repeater is marked with a daſh, thus, β.

1. Required the ſum of ·7ζ, ·27β, γ, ·217, ·72β, 6·01734δ, ·42ι, and 47·63.
2. Required the ſum of 21·64, β, 274·376, 7·32β, ·007682, 72, 100·χ, and ·β.
3. What is the ſum of 4·758γ, ·0cβ, ·784278, 87·48ι, ·κ, 174·β, 398·0η, and ·0cβ.

To ſubtract ſingle repeaters.

RULE.—In placing the leſs number under the greater, obſerve the rule for ſingle repeaters in addition; then ſubtract as in finite decimals; but if the under figure of the right hand column, be greater than the upper, borrow nine; the reſt as before. The right hand figure of the difference will be a repeater.

What is the difference between

1. 67·240β, and 9·5434?
2. 3·671569, and ·78623?
3. 8·761427, and ·94273?
4. ·620378, and ·3?

MULTIPLICATION *of* DECIMALS.

CASE I.

To multiply finite decimals.

RULE.—Multiply as in whole numbers, and point off in the product as many decimals as there are in both multiplicand and multiplier; but if the product does not contain as many figures, ſupply the defect by ciphers on the left.

What is the product of

1. 617·42 by 3·26? *anf.* 2012·7892?
2. ·2764 by 96? —— 26·5344.
3. 174 by ·149? —— 25·926.
4. 62·348 by ·00172? —— ·10723856.
5. ·0783 by ·461? —— ·0360963:
6. ·06948 by ·0087? —— ·000604476.
7. Required the product of one thouſand and thirty eight-millionth parts, by ſeventy ſeven hundredth parts?
anf. ·00079926.

CASE 2.

When the product will contain more decimals than are neceſſary, contract the work by the following

RULE.—Put a point over ſuch a place in the multiplicand as you deſign the right hand one of your product to be; then ſet the units' figure of the multiplier under the pointed one of the multiplicand, and the reſt of them in an inverted order. In multiplying begin at that figure of the multiplicand which ſtands directly above the figure you are multiplying by; ſetting the right hand figures underneath each other; obſerving to increaſe them by carrying from the product of the multiplier and the two figures of the multiplicand which are upon the right of it: thus, 1 from 5 to 15; 2 from 15 to 25; 3 from 25 to 35; 4 from 35 to 45; &c. When the multiplier has not the units' place ſupply it with a cipher.

Multiply

1. 47·61270 by 3·728653 limiting the product to 5 places of decimals. *anf.* 177·53123.
2. 73·842 by 1·16489 limiting the product to 3 places of decimals. *anf.* 86·018.
3. 7·06487 by 37·600543 limiting the product to 5 places of decimals. *anf.* 265·64294.
4. 14·7261 by ·4372 limiting the product to 4 places of decimals. *anf.* 6·4382.
5. ·42652 by ·6178 limiting the product to 5 places of decimals. *anf.* ·26351.
6. ·076143 by ·084374 limiting the product to 7 places of decimals. *anf.* ·0064244.

7. ·00143678 by ·06678735 limiting the product to 10 places of decimals. *anſ.* ·0000097519.

CASE 3.

When the right hand figure of the multiplicand is a ſingle repeater.

RULE.—Multiply as in caſe firſt, only carry at nine for the firſt figure of each product; then before you add the lines together, repeat them till their right hand figures ſtand directly under each other; and in adding, carry at nine as in addition of ſingle circulates.

anſwers.

1. Multiply 61·4326 by ·7 — 43·00284.
2. Multiply 5·72438 by 1·42. — 8·128632.
3. Multiply ·648758 by ·4867. — ·3157406764.
4. Multiply ·0614278 by ·064876. — ·003985192115333.

CASE 4.

When the right hand figure of the multiplier is a ſingle repeater.

RULE.—Multiply by the repeater as if it were a finite decimal, removing the product one place farther to the left, and divide it by nine, continuing the quotient (if needful) to a circulate; then perform with the other figures in the multiplier as if they were whole numbers.

Note. Begin at that place in the product, which is directly under the right hand figure of the multiplicand, to reckon for decimals.

anſwers.

1. Multiply 64·2973 by 4·3782. — 281·50786768.
2. Multiply ·4278 by ·273. — ·116932.
3. Multiply ·0376 by ·06786. — ·00255178.
4. Multiply 46786 by ·00374874. — 17·53887578.

CASE 5.

When both the multiplicand and multiplier have a ſingle circulate on the right.

RULE.—Multiply the circulate as in the laſt caſe, carrying at nine on the right; then perform with the other figures of the multiplier as directed in caſe third.

answers.

1. Multiply 4·746 by ·436. — 2·072759629.
2. Multiply 9·63283 by ·04872. — ·4693330463.
3. Multiply ·735874 by ·00378. - ·0027881465061728 39.

DIVISION *of* DECIMALS.

CASE 1.

To divide finite decimals.

RULE.—Divide as in whole numbers, and point off as many decimals in the quotient as the dividend has more than the divisor; but if there be not as many places in the quotient, put ciphers on the left to supply the defect; and if the dividend have not as many places of decimals as the divisor, annex ciphers till they be equal; or by annexing ciphers continually thereto, the division may be prolonged till nothing remains, till the quotient circulate, or as far as may be judged necessary.

Divide

1. 74·687342 by 6·35
2. 6·42973 by ·479
3. 4967·426 by ·72386
4. ·76438 by 7·4273
5. ·089725 by ·67349
6. ·00617483 by ·00741

Note. To divide by 1 with any number of ciphers on the right of it, the quotient will have the same figures as the dividend, with the decimal point as many places farther to the left as there are ciphers in the divisor.

Divide

1. 742·637 by 100.
2. 417·6 by 1000.
3. 49651 by 10000.
4. 7618 by 100000

CASE 2.

When the divisor consists of many figures, contract the work by the following

RULE.—Set the divisor regularly under as many of the right hand figures of the dividend, as will contain it less than ten times; and put a point over that figure in the dividend which stands straight above the units' place of the divisor. The first figure of

the quotient will poſſeſs the ſame place as the pointed figure of the dividend; then from the nature of the queſtion conſider how many figures the quotient muſt contain; take as many of the left-hand figures of the diviſor, and an equal number of the left of the dividend, if they will contain it, if not, take one place more, rejecting all the other figures. In dividing, account each remainder as a dividend, omitting a figure from the right of the diviſor for every diviſion; obſerving to increaſe the firſt figure of each product for the omitted figures, as in caſe ſecond multiplication; proceed in the ſame manner till all the figures of the diviſor are exhauſted.

1. Divide 326·4270 by 8·97482, retaining four places of decimals in the quotient. *anſ.* 36·3714.
2. Divide 16·7248367 by 2·61489736, retaining 5 places of decimals in the quotient. *anſ.* 6·39598.
3. Divide 1247·61523 by 54·61786, that the quotient may contain 3 places of decimals. *anſ.* 22·842.
4. Divide 7486·235 by ·096789735 retaining 2 places of decimals in the quotient. *anſ.* 77345·34.
5. Divide 2·6007300 by ·07486378, retaining 3 places of decimals in the quotient. *anſ.* 34·739.
6. Divide ·00764872 by ·008729643, that the quotient may contain 6 decimal places. *anſ.* ·876177.

CASE 3.

When the dividend has a ſingle repeater on the right.

RULE.—Divide as in caſe firſt, only inſtead of annexing ciphers to the remainder, when all the dividend figures are taken down, annex the circulate, and continue the diviſion till the quotient circulate, or is exact enough for the preſent purpoſe.

1. Divide 743·728 by 43·674.
2. Divide ·46736 by 4·6728.
3. Divide 7·63 by ·672876.

CASE 4.

When the diviſor is a ſingle repeater, or has one on the right of it.

RULE.—Multiply both the diviſor and dividend by nine, and conſider the products as another diviſor and dividend, with which do as in caſe firſt.

1. Divide 72·486 by ·3.
2. Divide 6·7948 by ·6.
3. Divide 74653 by 72·4.
4. Divide ·67243 by 7·216.
5. Divide 2·4367 by 07652.
6. Divide 74·6724 by 6·4378.

REDUCTION *of* DECIMALS.

CASE I.

To reduce vulgar fractions to decimals.

RULE.—If the fraction be not a simple one, reduce it thereto, in its least terms; then add one cipher or more, with a decimal point on the left to the numerator, and divide it by the denominator, the quotient will be the decimal required.

Reduce each of the following fractions to a decimal.

1. $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{7}$, $\frac{1}{8}$, & $\frac{1}{9}$.
2. $\frac{3}{4}$, $\frac{2}{3}$, $\frac{3}{8}$, $\frac{5}{8}$, $\frac{7}{8}$, & $\frac{9}{10}$.
3. $\frac{7}{16}$. *anf.* ·0418.
4. $\frac{48}{79}$. — ·6075949+
5. $\frac{6}{119}$ — ·037735849+
6. $\frac{1}{2}$ of $\frac{3}{4}$. — ·375.
7. $\frac{2}{3}$ of $\frac{3}{4}$. *anf.* ·5.
8. $\frac{2}{3}$ of $\frac{3}{4}$. — ·3.
9. $\frac{1}{5}$ of $\frac{7}{8}$. — ·175.
10. $\frac{1}{10}$ of $\frac{9}{10}$. — ·05625.
11. $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$. — ·25.
12. $\frac{2}{3}$ of $\frac{7}{8}$ of $\frac{9}{10}$. — ·525.

Mr Colſon's method of reducing a vulgar fraction, whoſe denominator is a prime number*, greater than 11, to a decimal, of a conſiderable number of places, is ſo much to the purpoſe, that his manner of doing it is here ſubjoined.—

Let $\frac{1}{29}$ be propoſed: then by dividing as taught above till the remainder be a ſingle figure it will become $\frac{1}{29}$=·0344$8\frac{8}{29}$, then multiply the numbers on each ſide of the ſign of equality by the numerator 8, and it will give $\frac{8}{29}$=27586$\frac{6}{29}$, this ſubſtituted for $\frac{8}{29}$ makes $\frac{1}{29}$=·03448275862$\frac{6}{29}$. Again, multiply the numbers on each ſide of this ſign of equality by the numerator 6, and it will give $\frac{6}{29}$=206896551$7\frac{7}{29}$, this ſubſtituted for $\frac{6}{29}$ makes $\frac{1}{29}$=·034482758620689655$17\frac{7}{29}$. Again, multiply the numbers on each ſide of this ſign of equality by the numerator 7,

Note. When + is put after any anſwer, it denotes that it may be carried farther.

* A prime number is that which can only be meaſured by itſelf or a unit; that is, no other number but itſelf or a unit can divide it without a remainder.

and it will give $\frac{7}{29}$=·241379310344827586207/29, this fubſtituted for $\frac{7}{29}$ makes $\frac{1}{29}$=·0344827586206896551724137931034482758620 10/29, &c.

CASE 2.

To reduce money, weights, meaſures, &c. to decimals.

RULE 1.—If the quantity to be reduced conſiſt of one denomination, divide it by as many of that name as make one of the integer to which it is to be brought, and the quotient will be the anſwer.

2. If the quantity be a compound number, ſet the denominations under each other, beginning at the leaſt, for dividends, and on the left of theſe, place oppoſite to each dividend, ſuch a number for a diviſor, as will reduce it to the next ſuperior denomination, then annex one cipher or more, with a decimal point on the left, to the upper dividend; and divide, placing the quotient of each on the right hand of the following dividends, as a decimal part of it, and the laſt ſum will be the anſwer.

Reduce

1. 14*oz.* to the decimal of a *cwt.* — *anſ.* ·0078125.
2. 7*d.* — *gui.* — ·027.
3. 1*inc.* - *mile* - ·00001578 28.
4. 2*na.* — *yard* — ·125.
5. 6*s.* 4¼*d.* - *£.* — ·3177083. *oz. dwt.*
6. 4 17 - *lb.* troy — ·4041*ß*.
7. 17*s.* 9½*d.* - *£.* — ·889583.
8. 17*s* 9*d.* — *£* — 8875.
9. 1*day* - *year* 002739726+
10. 2*ro.* 17*po.* 14¼*yds.* - *acre.* *anſ* 60919+
11. 1*qr.* 16*lb.* - *cwt.* 392857+
12. 12*buſh.* — Newcaſtle chaldron — ·17647.

CASE 3.

To find the value of decimals of a given integer.

RULE.—Reduce the given decimal to the next inferior name, and point off in the product as many places of decimals as are in the given number; then reduce theſe to the next inferior name; proceed in the ſame manner to the loweſt name required; and the ſeveral figures on the left of the points will be the value of the decimal.

What is the value of

	anſ.		*anſ.*
1. 75*£.* —	15*s.*	9. ·723 of a London *chal.* of coals.	26·028*bu.*
2. ·125*moid.* —	3*s.* 4½*d.*	10. ·75 of a Newcaſtle *chal.* of coals.	51*bush.*
3. ·625*gui.* —	13*s* 1½*d.*	11. ·66676 of a yard long mea.	2·00028*f.*
4. ·1496*cr.* —	8*d.* 3 904*qrs.*	12. ·95*Ell E.* —	4*qr.* 3*na.*
5. ·0078125*cwt.* —	14*oz.*	13. ·1875*yd. ſq. m.* -	1*f.* 99*in.*
6. ·0495*hhd. wine* -	3·1185*ga.*	14. ·41875*acre* —	1*ro.* 27*po.*
7. ·375*bush.* —	1 *peck*, 1*gal.*		
8. ·671875 of a yard, Cloth Meaſure —	2*qr.* 2¾*na*		

The RULE OF THREE *in* DECIMALS.

RULE —State and work the queſtion as in whole numbers; only inſtead of reducing each term to its loweſt denomination, bring compound numbers and vulgar fractions to decimals.

1. If $\frac{3}{4}$*lb.* coſt $\frac{7}{12}$*ſh.* how much will $\frac{3}{10}$*lb.* come to?

anſ. 7*d.* 2$\frac{3}{7}$*qrs.*

Note. Take all the queſtions in the rule of three in vulgar fractions.

The RULE OF FIVE *in* DECIMALS.

THIS rule is the very ſame as that given for the rule of three in decimals.

1. If 2 men mow $\frac{3}{4}$ of an acre in $\frac{1}{3}$ of a day, how many acres will 6 men mow in 3$\frac{1}{3}$ days?

anſ. 11$\frac{1}{4}$*acres.*

Note. Take all the queſtions in the rule of five in vulgar fractions.

EXTRACTION *of the* SQUARE ROOT.

WHEN any number is multiplied by itſelf, the product is called the ſquare of that number; as, $7 \times 7 = 49$ the ſquare of 7. Therefore to extract the ſquare root of any quantity, is to find ſuch a number, which being multiplied by

itſelf, produces the given quanity; thus, the ſquare root of 49 is 7, becauſe $7 \times 7 = 49$. Square root of 36 is 6, becauſe $6 \times 6 = 36$, &c.

Roots	1	2	3	4	5	6	7	8	9	10	11	12
Squares	1	4	9	16	25	36	49	64	81	100	121	144

RULE *for* EXTRACTING *the* SQUARE ROOT.

1. Point the given number into periods of two figures each, beginning at the units' place, going to the left for integers, and to the right for decimals *

2. Find a ſquare number either equal to, or the next leſs than the left hand period; and place its root in the quotient; ſubtract the ſquare number from the firſt period, and to the difference bring down the next period for a dividend.

3. Double the quotient figure for the firſt part of the diviſor, and ſee how often it is contained in the dividend (excepting the units' place) ſet the number of times in the quotient, and alſo on the right of the firſt part of the diviſor, which completes the diviſor; multiply the whole diviſor by the laſt quotient figure, and ſubtract the product from the dividend; to the remainder annex the next period; then double the right hand figure of the laſt diviſor, which, together with the other figures belonging to it, will form a new diviſor, with which proceed as before.

Note. There muſt always be an even number of decimals in the quantity to be extracted.

Extract the ſquare root of

		anſ.			*anſ.*
1. 256	—	16	6. 12345·729	—	111·11+
2. 18769	—	137	7. 718 67213	—	26·80806+
3. 784	—	28	8. 5078·23	—	71·2617+
4. 7590·417129	—	87·123	9. 12	—	3·464+
5. 67897·0186	—	260·57+	10. 101	—	10·0498756+

* There will be as many integers, as there are periods of integers, and as many decimals as there are periods of decimals.

To Extract the SQUARE ROOT *of a* VULGAR FRACTION.

RULE.—Reduce the fraction to its leaſt terms; then find the root of the numerator and denominator for the anſwer. But if the root of either the numerator or denominator cannot exactly be found, reduce the fraction to a decimal, and extract its root.

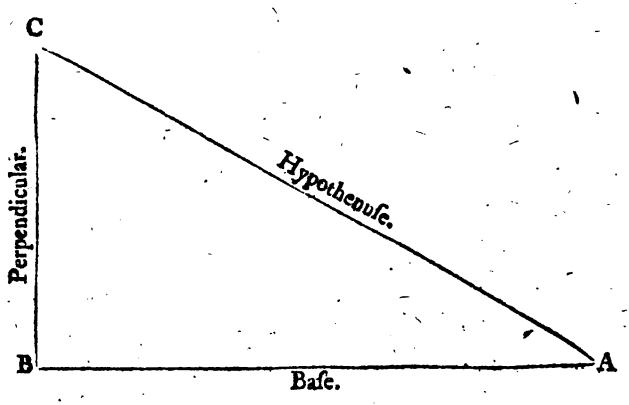
What is the ſquare root of

1. $\frac{81}{49}$	*anſ.*	$\frac{9}{7}=1\frac{2}{7}$	4. $\frac{406}{578}$	*anſ.*	·71214+
2. $\frac{144}{256}$	——	$\frac{3}{4}$	5. $\frac{9}{17}$	——	·7276+
3. $\frac{1152}{400}$	——	$\frac{12}{5}=2\frac{2}{5}$	6. $\frac{413}{921}$	——	$\frac{2}{3}$

The Uſe of the SQUARE ROOT.

IN the right angled triangle A B C; A C is called the Hypothenuſe, A B the Baſe, and B C the perpendicular.

A right angle is formed by one ſtraight line ſtanding upon another in ſuch a manner, that it does not incline more to one ſide than another; as B C upon A B.



CASE 1.

Having the hypothenuſe and baſe given, to find the perpendicular.

RULE.—Subtract the ſquare of the baſe from the ſquare of the hypothenuſe, and the ſquare root of the difference will be the anſwer.

Given the hypothenuſe 225, and the baſe 180; required the perpendicular. *anſ.* 135.

CASE 2

Having the hypothenuſe and perpendicular given, to find the baſe.

RULE.—Subtract the ſquare of the perpendicular from the ſquare of the hypothenuſe, and the ſquare root of the difference will be the anſwer.

Given the hypothenuſe 225, and the perpendicular 135; required the baſe? *anſ.* 180.

CASE 3.

Having the baſe and perpendicular given, to find the hypothenuſe.

RULE.—Add the ſquares of the baſe and perpendicular together, and the ſquare root of the ſum will be the anſwer.

Given the baſe 180, and the perpendicular 135; required the hypothenuſe? *anſ.* 225.

The following Examples are founded upon the three foregoing Caſes.

1. Required the length of a ladder that will reach from the edge of a ditch, which is 18 feet broad ſurrounding a fort, to the top of the fort, which is 34·82 feet high? *anſ.* 39·19+.

2. Required the length of a ſhoar, that is to ſtand 5½ feet from a building, which will ſupport a jamb 11·9 feet from the ground? *anſ.* 13+.

3. Wanting to find the height of a rock, which was nearly perpendicular, I ſtood 55½ yards from the bottom, and found

that the diſtance from the place where I ſtood to the top of the rock was 140½ yards; required its height? *anſ.* 129·07 *yards.*

4. A ladder, 40 feet long, may be ſo placed, that it will reach a window 33 feet from the ground on one ſide the ſtreet; and, without moving it at the foot, will do the ſame to a window 21 feet high on the other ſide; required the breadth of the ſtreet? *anſ.* 56·64 *feet.*

5. A ladder, 65 feet long, was ſtanding upright againſt a wall of the ſame height; but the workmen having occaſion to go in at a window, ſlid the ladder 25 feet from the building in order to accompliſh their purpoſe; required how much the top of the ladder fell from the ſummit of the wall? *anſ.* 5 *feet.*

6. There are three towns M, N, and P, ſo ſituated, that N lies 240 miles ſouth of M, and P 180 miles weſt of M; required the diſtance between N and P? *anſ.* 300 *miles.*

7. There are two towers on a plain, the one 240 feet high, and the other 180; a ladder placed in the line of diſtance between them, 215 feet from the bottom of the loweſt, will touch the top of both towers; required the length of the ladder, and the diſtance between the towers? *anſ.* 280·4 feet the length of the ladder, and 360 feet the diſtance between the towers.

8. If the ſemi-diameter of the earth be 4000 miles, and the height of a mountain be 3 miles; at what diſtance will it be ſeen at ſea, or on plain ground, the eye of the ſpectator being ſuppoſed on the ſurface? *anſ.* 155 *miles nearly.*

9. There are two columns in the ruins of Perſepolis left ſtanding upright: the one is 64 feet above the plain, and the other 50; in a ſtraight line between theſe two, ſtands an ancient ſmall ſtatute, the head of which is 97 feet from the ſummit of the higher, and 86 from the top of the lower, the diſtance of the baſe of which column to the center of the ſtatute's baſe is 76 feet; required the diſtance between the top of the columns? *anſ.* 157+ *feet.*

10. The height of an elm, growing in the middle of a ſmall circular iſland, 30 feet in diamter, is 53 feet, and a line ſtretched from the top of the tree to the outſide of the water is 112 feet; what is the breadth of the water ſurrounding the iſland? *anſ.* 83·6 *feet.*

11. A may-pole, whoſe top was broken off by a blaſt of wind, ſtruck the ground at 15 feet from the pole: what was the length of the whole may-pole, ſuppoſing the broken piece to be 39 feet? *anſ.* 75 *feet.*

To find the mean proportional between two given numbers.

RULE.—Multiply the two numbers together, and extract the ſquare root of the product for the anſwer.

1. What is the mean proportional between 49 and 64?
anſ. 56.

2. What is the mean proportional between 16 and 256?
anſ. 64.

3. What is the mean proportional between 16 and 36?
anſ. 24.

4. A gentleman has a garden in the form of a parallelogram, whoſe longeſt ſide is 64 fathoms, and the ſhorteſt 36, which he intends to change into a ſquare of the ſame area; required the ſide of the ſquare? *anſ.* 48 *fathoms.*

5. Suppoſe a general had an army of 567009 men, and he would form them into a ſquare, how many muſt be in rank and file? *anſ.* 753.

To EXTRACT *the* CUBE ROOT.

WHEN any number is multiplied by itſelf, and that product by the firſt number, the laſt product is called the cube; thus, $8 \times 8 = 64 \times 8 = 512 =$ cube of 8. Therefore to extract the cube root is to find ſuch a number that being multiplied by itſelf and the product again by the firſt number, produces the given number: thus, the cube root of 125 is 5, becauſe $5 \times 5 \times 5 = 125$. The cube root of 343 is 7, becauſe $7 \times 7 \times 7 = 343$.

TABLE of the first twelve powers of Numbers.

1st power	1	2	3	4	5	6	7	8	9
2d power	1	4	9	16	25	36	49	64	81
3d power	1	8	27	64	125	216	343	512	729
4th power	1	16	81	256	625	1296	2401	4096	6561
5th power	1	32	243	1024	3125	7776	16807	32768	59049
6th power	1	64	729	4096	15625	46656	117640	262144	531441
7th power	1	128	2187	16384	78125	279936	823543	2097152	4782969
8th power	1	256	6561	65536	390625	1679616	5764801	16777216	43046721
9th power	1	512	19683	262144	1953125	10077696	40353607	134217728	387420489
10th power	1	1024	59049	1048576	9765625	60466176	282475249	1073741824	3486784401
11th power	1	2048	177147	4194304	48828125	362797056	1977326743	8589934592	31381059609
12th power	1	4096	531441	16777216	244140625	2176782336	13841287201	68719476736	282429536481

RULE.—Divide the number to be extracted into periods of three figures each, beginning at the units' place, and find a cube number either equal to, or the next leſs than, the left hand period; ſubtract the cube number from the firſt period, and to the difference bring down the next period, which call a dividend.

Find the diviſor by multiplying the ſquare of the number in the quotient by 300; conſider how often it is contained in the dividend, and put the number of times in the quotient; multiply the diviſor by this quotient figure; then add a cipher to the number which was ſquared to find the diviſor by, and multiply it by 3, and that product again by the ſquare of the laſt quotient figure; cube the laſt quotient figure. Place theſe three ſums regularly under the dividend, add them together, and call their ſum the ſubtrahend, which ſubtract from the dividend, and to the difference bring down the next period; proceed in the ſame manner till all the periods are brought down.

Note. The ſubtrahend muſt never be more than the dividend.

Extract the cube root of		
1. 11089567	*anſ.*	223.
2. 76765·625	—	42·5.
3. 4149·995543	—	16·07.
4. 27407028375	*anſ.*	3015.
5. 800125·725	—	92·8+
6. 122615327232	—	4968.
7. 401719179	—	737+

To EXTRACT *the* CUBE ROOT *of a* VULGAR FRACTION.

RULE.—Reduce the fraction to its loweſt terms; then extract the cube root of the numerator and denominator for the anſwer. But if that cannot be done, reduce the fraction to a decimal, and extract the cube root of it.

Extract the cube root of		
1. $\frac{3560}{1843}$	*anſ.*	$\frac{8}{9}$.
2. $\frac{704}{2176}$	—	$\frac{2}{3}$.
3. $\frac{3}{4}$	*anſ.*	·9085+
4. $\frac{1}{2}$	—	·7937+
5. $7\frac{2}{3}$	—	1·97+

The USE *of the* CUBE ROOT.

TO find two mean proportionals between two given numbers.

RULE.—Divide the greater number by the leſs, and extract the cube root of the quotient; which root multiplying the leſs number will give the leaſt mean proportional, and dividing the greater number will give the greateſt.

1. What are the two mean proportionals between 5 and 320? *anſ.* 20 and 80.

2. What are the two mean proportionals between 64 and 512? *anſ.* 128 and 256.

3. What are the two mean proportionals between 7 and 15379? *anſ.* 91 and 1183.

Having the dimenſions of any ſolid body given, to find the dimenſions of a ſimilar one, that will be any number of times greater or leſs.

RULE.—Multiply or divide the cube of each of the given dimenſions, by the number of times that the required ſolid is to be greater or leſs than the given one; then the cube root of each product or quotient will be the dimenſions of the ſolid required.

1. There is a cubical veſſel, whoſe ſide is 12 inches; required the ſide of a ſimilar veſſel that will contain three times as much? *anſ.* 17·306+.

2. There is a ciſtern 5 feet long, 4 broad, and 3 deep, wherein is contained a certain quantity of water; required the dimenſions of another ciſtern that will contain 5·832 times as much? *anſ.* 9*feet* long, 7·2 broad, and 5·4 deep.

3. Suppoſe the length of a ſhip's keel be 44 feet, the midſhip beam 15, and the depth of the hold 9; required the dimenſions of another ſhip, of the ſame form, that will carry three times the burden?

anſ. The length of the keel 63·46, the midſhip beam 21·63, *rem.* 3. and the depth of the hold 12·978*feet*. *rem.* 18.

4. Required the length, breadth, and depth of a box, that will hold 8000 oranges, each of whoſe ſhorteſt diameters is 2·179 inches, and the longeſt 3·375? *anſ.* 67·5 inches in length, 43·58 in breadth, and 43·58 in depth.

5. If a ship's keel be 125 feet long, the midship beam 25, and the depth of the hold 15; required the dimensions of another ship of the same form, that will carry but half the quantity?

anſ. 99·2 feet, the keel, 19·84 the midship beam, and 11·9 the depth of the hold.

6. If a ship's keel be 45 feet, the breadth 17·3, the depth 8·7, and her burden 72 tons; required the dimensions of a similar ship whose burden is 360 tons?

anſ. Length of the keel 76·95 feet, midship beam 29·583, and depth 14·877.

Note. The solidity of like figures are in proportion to each other, as the cubes of their similar sides or diameters.

7. If a ball of four inches diameter weigh 9½*lb.* required the weight of a similar one whose diameter is 7 inches?

anſ. 50·9*lb.*

8. If a cube of silver, whose side is 3 inches, be worth 8*l.* 17*s.* 6*d.* required the side of a cube of the same silver, whose value shall be three times as much? *anſ.* 4·326, &c.

9. Suppose there is a stone 20 inches long, 15 broad, and 8 deep, which weighs 217*lb.* required the length, breadth, and depth of a like stone, which weighs 1000*lb.*

anſ. 33·28 inches long, 24·96 broad, and 13·312 deep.

10. There are 3 chests, the first contains 10000 solid inches, the second 16656, and the third 20000, required the side of a cubical chest that will contain as much as all the three?

anſ. 36 *inches.*

11. If a ship of 300 tons be 75 feet long in the keel; required the burden of a similar ship, whose keel is 100 feet long?

anſ. 711·*x tons.*

12. If a ship of 72 tons burden be 45 feet long in the keel, 17·3 and in breadth, 8·7 depth; required the dimensions of a similar ship that will carry 5 times as much?

anſ. Length 76·9, breadth 29·583, depth 14·877.

To find the TONNAGE *of* SHIPS.

RULE 1.—Multiply the length of the keel, taken within board, so much as the ship treads upon the ground, by the length of the midship beam, within board, taken from plank to

plank, and that product by half the breadth, taken as the depth, then divide the laſt product by 94, and the quotient will give the tonnage.

1. If the length of a ſhip's keel be 80 feet, and the midſhip-beam 30; required the tonnage? *anſ.* 382·9787+

2. If the length of a ſhip's keel be 87 feet 6 inches, and the midſhip-beam 28 feet 8 inches; required the tonnage?

anſ. 382·476 *tons.*

RULE 2.—Ship-wrights take the dimenſions on the outſide of the light mark, as the ſhip ſwims being unladen, to find the content of the empty ſhip. But if the meaſure of the ſhip be taken from the light mark to her full draught of water, when laden, it will give the burden of the ſhip: And then the length, breadth, and depth multiplied together, and divided by 100 for men of war (which gives an allowance for guns, anchors, &c. that are all burden but no tonnage) and by 95 for merchant ſhips, gives the tonnage.

N. B. A hundred ſolid feet make a ton.

Required the tonnage of Noah's ark, whoſe length was 300 feet, breadth 50, and depth 30? *anſ.* 4736$\frac{16}{19}$ *tons.*

RULE 3.—At London, ſhip-wrights multiply the length of the keel by the extreme breadth of the ſhip, taken from outſide to outſide, and that product by half the breadth; and this they divide by 94 for merchant ſhips, and by 100 for men of war; the quotients are the tonnage.

1. Required the tonnage of an eighty-gun ſhip, the length of whoſe keel is 149 feet 4 inches, and her extreme breadth 49 feet 8 inches? *anſ.* 1841·86+.

2. Given the length of the keel of a ſeventy-four, 138 feet, and the extreme breadth 46 feet 9 inches; required the tonnage? *anſ.* 1508·038125 *tons.*

3. Required the tonnage of an Eaſt Indiaman, the length of whoſe keel is 132 feet 8 inches, and the extreme breadth 38 feet? *anſ.* 1018·99.

The following method is uſed in the royal navy.

RULE 4.—Let fall a perpendicular from the foreſide of the ſtern at the height of the bawſe holes, and another from the back of the main port at the height of the wing tranſom: from the length between theſe perpendiculars deduct $\frac{1}{5}$ of the extreme breadth, and as

many times $2\frac{1}{2}$ inches as there are feet in the height of the wing tranſom above the upper edge of the keel, the remainder is the length of the keel for tonnage. Then multiply the length of the keel by the extreme breadth, and that product by half the breadth; divide this product by 94 gives the tonnage.

1. Given the length of the keel 68 feet, the extreme breadth 22; required the tonnage. *anſ.* $175\frac{6}{94}$.
2. Required the tonnage of a ſhip whoſe keel is 78 feet, and the extreme breadth $24\frac{1}{2}$ feet. *anſ.* $249\frac{15}{176}$.
3. Given the length of the keel 70 feet, extreme breadth 24; required the tonnage. *anſ.* $214\frac{44}{94}$.

MULTIPLICATION *of* DUODECIMALS.

THIS Rule is chiefly uſed by artificers in taking the dimenſions of their work.

Feet multiplied by feet give feet.
Feet multiplied by inches give inches.
Feet multiplied by parts give parts.
Inches multiplied by inches give parts.
Inches multiplied by parts give ſeconds.
Parts multiplied by parts give thirds.

12 Fourths	Make	1 Third
12 Thirds		1 Second
12 Seconds		1 Part
12 Parts		1 Inch
12 Inches		1 Foot

RULE 1.—Place feet under feet, inches under inches, &c. then multiply the loweſt denomination of the multiplicand by the higheſt of the multiplier, ſetting down the products according to the above table; proceed with the leſs denominations of the multiplier in the ſame manner.

1. Multiply 7 feet, 4 inches; by 4 feet, 2 inches.
anſ. 30 *feet*, 6 *inches*, 8 *parts*.
2. Multiply 6 feet, 7 inches; by 9 feet, 3 inches.
anſ. 60 *feet*, 10 *inches*, 9 *parts*.

3. Multiply 12 feet, 5 inches; by 4 feet, 9 inches.
anf. 58 *feet*, 11 *inches*, 9 *parts*.
4. Multiply 11 feet, 10 inches; by 12 feet, 10 inches.
anf. 151 *feet*, 10 *inches*, 4 *parts*.
5. Multiply 17 feet, 9 inches; by 13 feet, 6 inches.
anf. 239 *feet*, 7 *inches*, 6 *parts*.
6. Multiply 6 feet, 4 inches, 7 parts; by 6 feet, 7 inches, 3 parts. *anf.* 42 *feet*, 1 *inch*, 9 *parts*, 2 *seconds*, 9 *thirds*.
7. Multiply 26 feet, 3 inches, 4 parts; by 10 feet, 6 inches, 7 parts. *anf.* 277 *feet*, 2 *inches*, 3 *parts*, 11 *seconds*, 4 *thirds*.
8. Multiply 180 feet, 7 inches; by 5 feet, 7 inches, 8 parts.
anf. 1018 *feet*, 3 *inches*, 5 *parts*, 8 *seconds*.
9. Multiply 20 feet, 8 inches, 4 parts; by 8 feet, 7 inches.
anf. 177 *feet*, 7 *inches*, 6 *parts*, 4 *seconds*.
10. Multiply 175 feet, 6 inches, 3 parts; by 16 feet.
anf. 2808 *feet*, 4 *inches*.

RULE 2.—If the number of feet in both multiplicand and multiplier be great, take even parts for the inches, parts, &c. as in practice.

	feet.	*inc.*	*feet.*	*inch.*		*feet.*	*inc.*	*pa.*
1. Multiply	871	9 by	29	11.	*anf.*	26079	10	3.
2. Multiply	187	4 by	174	9.	——	32736	6	0.
3. Multiply	617	10 by	317	4.	——	196059	1	4.
4. Multiply	197	6 by	200	5.	——	39582	3	6.
5. Multiply	413	7 by	157	8.	——	65208	3	8.
6. Multiply	178	11 by	307	1.	——	54942	3	11.

RULE 3.—When there are yards in the queſtion, multiply by the number of them, and take parts for the leſs denominations.

	yd.	*fe.*	*in.*	*yd.*	*fe.*	*in.*		*yd.*	*fe.*	*in.*	*pa.*	*ſe.*
1. Multiply	9	2	7 by	4	2	10	*anf.*	48	2	3	3	4
2. Multiply	24	1	0 by	12	1	6	——	304	0	6	0	0
3. Multiply	37	2	8 by	7	2	4	——	294	2	0	10	8
4. Multiply	48	0	7 by	11	1	6	——	554	0	8	6	0
5. Multiply	120	2	0 by	7	2	4	——	938	1	6	8	0
6. Multiply	67	1	4 by	6	0	7	——	417	2	4	1	4

SQUARING DIMENSIONS.

RULE.—Multiply the length by the breadth, and the product will be the anſwer.

1. Required how many ſquare yards are in a room floor, whoſe length is 30 feet, 6 inches; and the breadth, 25 feet, 4 inches? *anſ.* 85 *yards*, 7 *feet*, 8 *inches*.

2. If a pane of glaſs be 4 feet, 8 inches, 9 parts long; and 1 foot, 4 inches, 3 parts broad; how many feet of glaſs does it contain? *anſ.* 6 *feet*, 4 *inches*, 10 *parts*. 2, 3.

3. What is the value of a piece of timber, whoſe length is 27 feet, 6 inches; and breadth 10 feet, 11 inches; at 2*s*. 7½*d*. per ſquare yard? *anſ.* 4*l*. 7*s*. 6½*d*.

4. How many ſquares are contained in a partition that is 64 feet, 6 inches long; and 12 feet, 3 inches broad?

anſ. 7 *ſquares*, 90 *feet*, 1 *inch*, 6 *parts*.

Note. 100 ſquare feet make a ſquare.

5. If a ceiling be 54 feet, 9 inches long; and 22 feet, 6 inches broad, how many ſquare yards are contained in it?

anſ. 136 *ſq. yds*, 7 *feet*, 10 *inches*, 6 *parts*.

6. A round pillar is to be painted, whoſe height is 18 feet, 4 inches, and the girt 10 feet, 6 inches; how many yards are in it? *anſ.* 21 *ſq. yds*, 3 *feet*, 6 *inches*.

7. What will the glazing of a large window come to, at 10*d*. per foot, whoſe breadth is 12 feet, 6 inches, and height 16 feet, 9 inches? *anſ.* 8*l*. 14*s*. 5½*d*.

8. What is a marble ſlab worth, whoſe length is 5 feet, 7 inches; and breadth 1 foot, 10 inches, at 6*ſh*. per foot?

anſ. 3*l*. 1*s*. 5*d*.

9. If a houſe have 3 tier of windows, 4 in a tier; and if the height of the firſt tier be 6 feet, 3 inches; of the ſecond 5 feet, 4 inches: and of the third 4 feet, 9 inches; and the breadth of each 3 feet, 6 inches; what will the glazing come to, at 15*d*. per foot? *anſ.* 14*l*. 5*s*. 10*d*.

10. One has paved a rectangular court yard, 42 feet, 9 inches in breadth, and 68 feet, 6 inches in length; and in it he has laid a foot-way the length of the court yard, and 5 feet, 6 inches broad; the foot-way is laid with purbick ſtone, at 3*s*. 6*d*. per yard, and the reſt with pebbles, at 3*s*. per yard; what will the whole come to? *anſ.* 49*l*. 17*s*. 0¼*d*.

11. Suppoſe a brick wall, round a garden, meaſure 974 feet, round, and 9 feet, 6 inches high; what did the building of it come to, at 5*l.* 15*s.* 6*d.* per rod of 272¼ ſquare feet.

anſ. 196*l.* 5*s.* 6*d.*

12. What is the value of 5 oaken planks, at 3*d.* a foot, each 17 feet, 6 inches long, and whoſe breadths are two of them each 1 foot, 1 inch 6 parts in the middle, the third 1 foot, 6 inches, in the middle, the fourth 11 inches, 3 parts, and the fifth 1 foot 2 inches 3 parts? *anſ.* 1*l.* 5*s.* 8¼*d.*

LOSS *and* GAIN.

AS this rule is only the application of the Rule of Three, to find the gain or loſs upon goods, the following obſervations, together with the knowledge of that rule, will be ſufficient for the ſolution of the following queſtions.

OBSERVATION 1.—When the gain or loſs upon any quantity of goods is required. Say, as the quantity, whoſe gain or loſs is given, is to its gain or loſs; ſo is the quantity whoſe gain or loſs is required, to its gain or loſs.

2. When the gain or loſs is *given* at ſo much per cent, make 100*l.* with the gain added, or loſs ſubtracted, the middle term of the ſtating. When *required*, ſay, as the prime coſt of any quantity is to its gain or loſs; ſo is 100*l.* to its gain or loſs.

3. To find the prime coſt of goods: ſay, as the ſelling price of the goods (whoſe prime coſt is given) is to their prime coſt; ſo is the ſelling price of the goods (whoſe prime coſt is required) to their prime coſt.

1. At 1*s.* 6*d.* gain per 1*l.* ſterling, how much per cent?

anſ. 7*l.* 10*s.*

2. Bought tea for 9*s.* 6*d.* per *lb.* and ſold it at 14*s.* per *lb.* how much will be gained by ſelling 100*lb.* at the ſame rate?

anſ. 22*l.* 10*s.*

3. Suppoſe I gain 22*l.* 10*s.* by ſelling 100*lb.* of tea, how much was that per *lb.* *anſ.* 4*s.* 6*d.*

4. By ſelling cloth at 12*s.* per yard, I gain 15*l.* per cent; what ſhall I gain when I am obliged to ſell it at 10*s.* 6*d* per yard.

anſ. 12*s.* 6*d.* gain *per cent.*

5. Bought tobacco at 7*l.* 16*s.* per *cwt.* and ſold it for 12*l.* 12*s.* per *cwt.* what was the gain per cent?

anſ. 61*l.* 10*s.* $9\frac{1}{11}d.$

6. A merchant bought a quantity of raiſins for 187*l.* but they proving not ſo good as expected, he is willing to loſe 5*l.* per cent; how much will he loſe upon the whole? *anſ.* 9*l.* 7*s.*

7. Sold ſilk at 12*s.* 6*d.* per yard, and thereby gained 7*l.* 10*s.* per cent; what did it coſt per yard? *anſ.* 11*s.* 7*d.* $2\frac{6}{43}qrs.$

8. Suppoſe I buy ſugar for 3*l.* 17*s.* per *cwt.* how muſt I ſell it per *lb.* to gain 10*l.* 10*s.* per cent? *anſ.* $9\frac{9}{80}\frac{3}{0}d.$

9. If by retailing a large caſk of beer, containing 718 gallons, I gain 11*l.* 19*s.* 4*d.* what did it coſt me per quart? *anſ.* 3*d.*

Note. Beer is commonly ſold at 4*d.* per quart.

10. Sold 100 gallons of brandy, for 61*l.* 13*s.* 4*d.* and by ſo doing, gained 12*l.* 10*s.* per cent, what was the prime coſt of a gallon? *anſ.* 10*s.* 11*d.* $2\frac{3}{61}qrs.$

11. Being under the neceſſity of diſcharging a bill, I ſold a large web of linen for 40*l.* and thereby loſt 7*l.* 10*s.* per cent, whereas, according to the common rate of buſineſs, I ought to have gained 10*l.* per cent; required how much the web was ſold under its proper value? *anſ.* 7*l.* 11*s.* $4\frac{8}{77}d.$

12. By ſelling hops I gained 5*l.* 15*s.* a pocket, which is the $\frac{1}{6}$ of what they coſt me; what was the gain per cent?

anſ. 16*l.* 13*s.* 4*d.*

13. Sold 120 buſhels of wheat, at 5*s.* 10*d.* per buſhel, by which I loſt $9\frac{1}{11}l.$ per cent; but the market riſing, I ſold an equal quantity for 6*s.* $11\frac{1}{2}d.$ per buſhel; whether did I gain or loſe by the latter quantity, and how much in the whole?

anſ. Gained 3*l.* 5*s.* by the latter quantity, but loſt 5*s.* in the whole.

14. By ſelling cloth I gain 1*s.* 4*d.* per yard, which is the $\frac{1}{7}$ of what I paid for it, what is the gain per cent?

anſ. 14*l.* 5*s.* 8*d.* $2\frac{3}{7}qrs.$

BARTER.

BARTER is the exchanging of commodities, and teaches perſons who barter, how to proportion the value of goods, ſo as neither party may ſuffer loſs.

Case 1.

To find how much of one commodity must be given for another. This is done by the Rule of Three.

Case 2.

When the quantities of two commodities, of unequal value, are given for each other, to find the balance in money or in goods.

Calculate the value of the given commodities, by their proper rules, and their difference will be the balance in money: when the balance is to be paid in goods, find what quantity of them this balance will purchase.

In bartering, goods are often rated above their true value: therefore having the ready money and bartering price of one commodity given, as also the ready money price of another commodity given, to find its bartering price; say, as the ready money price of the one, is to its bartering price, so is the ready money price of the other, to its bartering price.

1. How much barley, at 5*s.* 6*d.* per bushel, will be received for 100 bushels of wheat, at 6*s.* 9*d.* per bushel?

ans. $122\frac{8}{11}$ *bush.*

2. How much sugar, at 4*l.* 15*s.* per *cwt.* will be got for 29*cwt.* of hops, at 7*l.* 12*s.* per *cwt.* *ans.* 46*cwt.* 1*qr.* $16\frac{76}{77}$*lb.*

3. How many hogsheads of tobacco, at 52*l.* 10*s.* per hogshead, must be given in barter for 1000 ells of holland, at 5*s.* 6*d.* per ell? *ans.* 22*hhds.*

4. M and N barter: M has 60 yards of superfine raven grey, at 19*s.* 6*d.* per yard, for which N would give him 102 yards of common yard wide, at 4*s.* 3*d.* per yard, and the balance in money: how much money must M receive?

ans. 36*l.* 16*s.* 6*d.*

5. A and B barter: A has 2*cwt* of tea, at 10*s.* 6*d.* per *lb.* for which B would give him 300*lb* of coffee, at 4*s.* 3*d.* per *lb.* and pay the balance in sugar, at $10\frac{1}{2}$*d.* per *lb.* how many *lb.* of sugar must be given? *ans.* 1230$\frac{6}{7}$*lb.*

6. What was cloth per yard, when 66 yards of it were given for 70 gross of buttons, at $8\frac{1}{2}$*d.* per dozen? *ans.* $9\frac{1}{8}$*s.*

7. D and C barter: D has 27 reams of paper worth 12*s.* 6*d.* per ream, but in barter he charges 13*s.* 4*d.* C has quills worth 10*s.* 6*d.* per thousand; required the bartering price of the quills, and how many of them must be given for the paper.

anſ. 11*s.* $2\frac{1}{7}$*d.* per thouſand; $32\frac{1}{7}$ thouſands muſt be given for the paper.

8. P has 249 yards of Iriſh linen, at 4*s.* 4*d.* per yard, which he would barter with Q for 20 guineas ready money, and take the balance in home made linen, at 1*s.* 11*d.* per yard; how much of it will pay the balance? *anſ.* $343\frac{12}{21}$*yds.*

9. A gentleman has 129*oz.* 15*dwts.* of old ſilver, which he values at 4*s.* 3d. per ounce; and he propoſes to add 83*l.* 2*s.* $9\frac{1}{4}$*d.* thereto, in order to purchaſe a very curious and valuable piece of plate, weighing 260*oz.* 10*dwts.* Required how much the plate was rated per ounce? *anſ.* 8*s.* 6*d.*

10. E has 79 yards of muſlin, at 6*s.* 9*d.* per yard, but barters at 7*s.* and receives from F chintz, at 5*s.* 8*d.* per yard, which was only worth 5*s.* $5\frac{1}{4}$*d.* whether has the advantage in the barter, and how many yards of chintz muſt F give E for his muſlin?

anſ. 97*yds.* $2\frac{6}{17}$*qrs.* and F has the advantage, and his bartering price ſhould only have been 5*s.* 7*d.* $3\frac{15}{17}$*qrs.*

SIMPLE INTEREST.

INTEREST is a ſum allowed by the borrower to the lender, for the uſe of the ſum lent, at ſo much per cent per annum.

Simple Intereſt is that which ariſes only from the ſum lent, and ſhould never, legally, exceed 5*l.* per cent, per annum.

The ſum lent is called the principal.

The principal and intereſt added together are called the amount.

CASE 1.

To find the intereſt of any ſum of money, for any number of years.

RULE.—Multiply the principal, time, and rate per cent, together, and divide the product by 100, the quotient will be the anſwer.

1. What is the intereſt of 145*l.* for 1 year, at 5*l.* per cent, per annum? *anſ.* 7*l.* 5*s.*

2. What is the intereſt of 1087*l.* 18*s.* for 6 years, at 4*l.* per cent. per annum? *anſ.* 261*l.* 1*s.* $11\frac{7}{25}$*d.*

3. Required the intereſt of 75*l* 18*s*. 6*d*. for 3 years, at $4\frac{1}{4}$*l*. per cent. per annum? *anſ.* 10*l*. 4*s*. 11*d*. $3\frac{2}{5}\frac{2}{5}$*qrs*.

4. Required the intereſt of 500*l*. for 10 years, at $4\frac{3}{4}$*l*. per cent. per annum? *anſ.* 237*l*. 10*s*.

5. Required the intereſt of 26*l*. 16*s*. 10*d*. for 8 years, at $3\frac{1}{2}$*l*. per cent, per annum? *anſ.* 7*l*. 10*s*. 3*d*. $3\frac{7}{2}\frac{7}{5}$*qrs*.

6. What is the intereſt of 75*l*. 15*s*. for $\frac{3}{4}$ of a year, at 5*l*. per cent, per annum? *anſ.* 2*l*. 16*s*. $9\frac{3}{4}$*d*.

7. What is the intereſt of 10007*l*. for $7\frac{1}{2}$ years, at $4\frac{1}{2}$*l*. per cent, per annum? *anſ.* 3377*l*. 7*s*. 3*d*.

8. What is the intereſt of 106*l*. 16*s*. for $5\frac{1}{4}$ years, at $4\frac{3}{4}$*l*. per cent, per annum? *anſ.* 26*l*. 12*s*. 7*d*. $3\frac{2}{5}\frac{3}{2}$*qrs*.

CASE 2.

When the intereſt is required for weeks or days.

RULE.—Find the intereſt for a year; then for weeks; ſay, as 52, is to the intereſt of a year; ſo is the number of weeks, whoſe intereſt is required, to the anſwer. For days; ſay, as 365, is to the intereſt of a year; ſo is the number of days whoſe intereſt is required, to the anſwer.

J. & B.

Simple Interest.

A TABLE *shewing the Number of Days from any Day of one Month to the same Day of any other Month.*

To any Day of	From any Day of											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Jan.	365	334	306	275	245	214	184	153	122	92	61	31
Feb.	31	365	337	306	276	245	215	184	153	123	92	62
Mar.	59	28	365	334	304	273	243	212	181	151	120	90
Apr.	90	59	31	365	335	304	274	243	212	182	151	121
May	120	89	61	30	365	334	304	273	242	212	181	151
June	151	120	92	61	31	365	335	304	273	243	212	182
July	181	150	122	91	61	30	365	334	303	273	242	212
Aug.	212	181	153	122	92	61	31	365	334	304	273	243
Sep.	243	212	184	153	123	92	62	3	365	335	304	274
Oct.	273	242	214	183	153	122	92	61	30	365	334	304
Nov.	304	273	245	214	184	153	123	92	61	31	365	335
Dec.	334	303	275	244	214	183	153	122	91	61	30	365

Note 1. If it be leap year, and the month of February included in the time, one day muſt be added to the number in the table.

Note 2. Divide the year by 4, and if nothing remain it is leap year.

1. What is the intereſt of 137*l.* for 17 weeks, at 5*l.* per cent, per annum? *anſ.* 2*l.* 4*s.* 9*d.* $1\frac{1}{13}$*qr.*

2. What will 750*l.* amount to, in 46 weeks, at $4\frac{1}{2}$*l.* per. cent, per annum? *anſ.* 781*l.* 18*s.* 6*d.* $1\frac{1}{13}$*qr.*

3. What is the intereſt of 1000*l.* for 73 days, at 5*l.* per cent, per annum? *anſ.* 10*l.*

4. What will 100*l.* amount to in 19 years and 50 weeks, at 5*l.* per cent, per annum? *anſ.* 199*l.* 16*s.* 1*d.* $3\frac{5}{13}$*qrs.*

5. What will 500*l.* amount to, from *January* 6th, to *December* 3d, 1780, at $4\frac{1}{2}$*l.* per cent, per annum?

anſ. 520*l.* 9*s.* 3*d.* $3\frac{9}{13}$*qrs.*

6. What is the intereſt of 97*l.* from *February* 9th, to *September* 20th, 1788, at 5*l.* per cent, per annum?

anſ. 21*l.* 19*s.* 6*d.* $1\frac{3}{8}\frac{9}{0}$*qrs.*

7. If 10000*l.* were laid to intereſt *March* 7th, 1745, and continued to *May* 14th, 1753; how much muſt be received for principal and intereſt, at 4*l.* per cent, per annum?

anſ. 13274*l.* 10*s.* 4*d.* $3\frac{5}{7}\frac{3}{3}$*qrs.*

INSURANCE, BROKERAGE, *or* COMMISSION, *and* STOCKS.

INSURANCE is an agreement made in writing, called a policy, whereby, for a certain ſum, the inſurers agree to make good the value of the property, whether of ſhips, goods, houſes, &c. expreſſed in it.

Brokerage, or commiſſion, is an allowance to brokers at home, or agents abroad, for the buying or ſelling of goods for others.

Stocks are the public funds of the nation, ſuch as bank ſtock, india ſtock, South-ſea ſtock, &c.

Note. The following queſtions are calculated by Simple Intereſt.

1. What muſt be paid for inſuring 1000*l.* at $4\frac{1}{2}$*l.* per cent.

anſ. 45*l.*

2. What will the inſurance of a Weſt-India ſhip's cargo, valued at 7481*l.* 19*s.* come to, at $7\frac{1}{2}$*l.* per cent.

anſ. 561*l.* 2*s.* $11\frac{1}{10}$*d.*

3. What does the commiſſion of 417*l.* 18*s.* 6*d.* come to, at 2*l.* per cent. *anſ.* 8*l.* 7*s.* $2\frac{1}{2}$*d.*

4. What is the brokerage of 715*l.* 15*s.* 10*d.* at $5\frac{1}{2}$*s.* per cent.

anſ. 1*l.* 19*s.* 4*d.* $1\frac{6}{10}\frac{9}{0}$*qrs.*

5. How much will purchaſe 1189*l.* India ſtock, at 108$\frac{3}{8}$*l.* per cent. *anſ.* 1288*l.* 11*s.* 6*d.* 3$\frac{3}{5}$*qrs.*

6. How much will purchaſe 1786*l.* bank-ſtock, at 98$\frac{7}{8}$*l.* per cent. *anſ.* 1765*l.* 18*s.* 1*d.* 3$\frac{1}{5}$*qrs.*

7. My agent ſends me word that he has bought goods, on my account, to the value of 617*l.* 17*s.* 6*d*, what will his commiſſion come to, at 2$\frac{1}{2}$*l.* per cent. *anſ.* 15*l.* 8*s.* 11$\frac{1}{4}$*d.*

8. How much will purchaſe 1200*l.* of South-ſea ſtock, at 95$\frac{7}{8}$*l.* per cent. *anſ.* 1150*l.* 10*s.*

9. What is the brokerage of 467*l.* 15*s.* 9*d.* at 6*s.* per cent? *anſ.* 1*l.* 8*s.* 0*d.* 3$\frac{57}{100}$*qrs.*

10. My factor's ſales, per the Good Intent, amount to 917*l.* 14*s.* 11*d.* what is the commiſſion thereupon, at 2$\frac{1}{4}$*l.* per cent? *anſ.* 20*l.* 12*s.* 11*d.* 3$\frac{31}{100}$*qrs.*

11. An agent negociates a bill of 1010*l.* how much commiſſion will he receive, at 1$\frac{3}{4}$*l.* per cent. *anſ.* 17*l.* 13*s.* 6*d.*

12. In time of war, I inſured an Eaſt-India-man, whoſe value was 17972*l.* at 15$\frac{1}{2}$*l.* per cent; how much will the inſurance come to? *anſ.* 2785*l.* 13*s.* 2*d.* 1$\frac{3}{4}$*qr.*

13. How much ſtock will 381*l.* 13*s.* 10*d.* purchaſe at 77$\frac{7}{8}$*l.* ſterling per cent? *anſ.* 490*l.* 2*s.* 8$\frac{654}{843}$*d.*

COMPOUND INTEREST.

COMPOUND Intereſt, or intereſt upon intereſt, is that which ariſes from both principal and intereſt, that is, the intereſt, ſo often as due, being added to the principal, becomes a new principal.

RULE.—Divide the principal by the part which the intereſt is of 100*l.* the quotient will be the intereſt for the firſt year, which add to the given principal, the ſum will be the principal for the ſecond year; divide the ſecond year's principal in the ſame manner, and add the quotient thereto, this will give the third year's principal; and ſo on for any number of years.

Note. If the intereſt be not an even part of 100*l.* divide as in Practice.

1. What will 1000*l.* amount to in 4 years, at 5*l.* per cent per annum?

5	$\frac{1}{20}$	1000 Given principal 50 Firſt year's intereſt
5	$\frac{1}{20}$	1050 Second year's principal 52 10 Ditto intereſt
5	$\frac{1}{20}$	1102 10 Third year's principal 55 2 6 Ditto intereſt
5	$\frac{1}{20}$	1157 12 6 Fourth year's principal 57 17 7½ Ditto intereſt
		1215 10 1½ Amount 1000 Principal
		215 10 1½ Whole intereſt

2. What will 1784*l*, amount to in 6 years, at 5*l*. per cent, per annum, compound intereſt? *anſ.* 2390*l*. 14*s*. 6¾*d*.

3. What will the compound intereſt of 750*l* come to in 7 years, at 5*l*. per cent per annum? *anſ.* 305*l*. 6*s*. 5¾*d*.

4. How much will 100*l*. amount to, in 8½ years, at 5*l*. per cent, per annum? *anſ.* 151*l*. 8*s*. 9*d*.

EQUATION OF PAYMENTS.

EQUATION of payments is the finding of a mean time to pay ſeveral debts, which were due at different times, without loſs to either debtor or creditor.

RULE.—Multiply each ſum by its time, and divide the ſum of all theſe products by the whole debt, the quotient will be the mean time.

1. What will be the mean time to diſcharge a debt of 260*l*. payable as follows, *viz*. 70*l*. at 3 months, 100*l*. at 5 months, and and 90*l*. at 6 months? *anſ.* 4 *months*, 3 *weeks*, 1$\frac{6}{13}$ *day*.

2. A owes B 1000*l*. to be paid as follows, *viz* 500*l*. in 6 months, 100*l*. in 7 months, and the reſt in 12 months; but ſome time after they agree that the whole is to be paid at one time; required the mean time? *anſ.* 8 *months*, 2 *weeks*.

3. C bought goods from D to the value of 750*l.* and agrees to pay 300*l.* at 3 months; 400*l.* at 6 months, and the reſt at 8 months; but they agree afterwards to make one payment of the whole; I demand the equated time for the payment?

anſ. $4\frac{1}{15}$ *months.*

4. A certain debt is due as follows, *viz.* $\frac{1}{9}$ at 3 months, $\frac{4}{9}$ at 5 months, $\frac{6}{18}$ at 7 months, and the reſt at 12 months; Now if it were agreed to pay the whole at once, what would be the mean time? *anſ.* $6\frac{2}{3}$ *months.*

DISCOUNT.

DISCOUNT is an abatement of a certain ſum for the payment of money before it is due.

The preſent worth of any debt, or the ready money paid for it, is ſuch a ſum, that if it were put out to intereſt for the ſame time and rate per cent, the diſcount is allowed for, it would amount to the given debt.

RULE.—Say, as one year is to the rate per cent, per annum; ſo is the given time to the intereſt of 100*l.* for the given rate and time. Add this intereſt to 100*l.* then ſay, as this ſum is to the intereſt of 100*l.* for the given rate and time; ſo is the given ſum or debt, to the diſcount. When the preſent worth is required, make 100*l.* the middle term.

1. What diſcount muſt be allowed for the preſent payment of a debt of 917*l.* due 8 months hence, at $4\frac{1}{2}$*l.* per cent, per annum?

anſ. 26*l.* 14*s.* $2\frac{10}{103}$*d.*

2. Required the preſent worth of 175*l.* 15*s.* payable 10 months hence, at 5*l.* per cent, per annum?

anſ. 168*l.* 14*s.* 4*d.* $3\frac{1}{13}$*qrs.*

3. What ready money will diſcharge a debt of 535*l.* 17*s.* 6*d.* due in $4\frac{1}{2}$ months, at $4\frac{1}{2}$*l.* per cent, per annum?

anſ. 526*l.* 9*s.* $11\frac{7137}{12597}$*d.*

4. A tradeſman ſells goods to a merchant for 1000*l.* to be paid in 6 months; but the merchant is willing to pay ready money, provided he has an abatement of 5*l.* per cent per annum, how much ready money muſt be paid?

anſ. 975*l.* 12*s.* 2*d.* $1\frac{1}{11}$*qr.*

5. What is the discount of 140*l.* 18*s.* for 150 days, at $4\frac{1}{4}$*l.* per cent, per annum? *anf.* 2*l.* 8*s.* 4*d.* $1\frac{2}{3}\frac{7}{9}\frac{7}{1}\frac{3}{1}qr.$

6. How much ready money will I receive for a bill of 500*l.* due 11 months hence, when I allow for discount $3\frac{1}{4}$*l.* per cent, per annum? *anf.* 483*l.* 7*s.* $8\frac{2}{3}\frac{8}{1}d.$

7 A legacy of 800*l.* is left me by an uncle, to be paid 9 months after his decease; but I, being in want of ready money, agree with his executors, to allow them 5 per cent, per annum, for prompt payment, how much will I receive?

anf. 771*l.* 1*s.* $8\frac{2}{8}\frac{0}{1}d.$

8. Required the discount of 420*l.* 17*s.* from May 7th, to December 15th, at $4\frac{1}{2}$*l.* per cent, per annum?

anf 11*l.* 4*s.* 2*d.* $3\frac{1}{0}\frac{0}{7}\frac{2}{4}\frac{4}{0}\frac{7}{9}qrs.$

9. What is the present worth of 1786*l.* payable as follows, *viz.* 500*l.* in 6 months, 700*l.* in 9 months, and the rest in 12 months, at $3\frac{1}{2}$*l.* per cent, per annum?

anf. 1739*l.* 13*s.* 6*d.* $3\frac{6}{0}\frac{2}{9}\frac{9}{1}\frac{0}{0}\frac{6}{4}\frac{0}{2}\frac{6}{9}\frac{1}{9}qrs.$

COMPANY.

BY this rule, the accounts of persons in partnership are adjusted; and each partner's share of the gain or loss, is in proportion to the sum he has in the joint stock.

RULE.—As the whole stock, is to the whole gain or loss, so is each person's particular stock, to his particular gain or loss.

1. Two merchants, A and B, agree to trade together; A puts in 270*l.* and B 190*l.* they gain 100*l.* required each man's share of the gain?

anf. A's 58*l.* 13*s.* 10*d.* $3\frac{1}{3}\frac{8}{1}qrs.$ B's 41*l.* 6*s.* 1*d.* $0\frac{4}{1}\frac{4}{3}qr.$

2. Suppose three persons, D, E, and F, make a joint stock of 144*l.* of which D puts in 48*l.* E, 30*l.* and F 66*l.* they gain 126*l.* required how much each man will receive of the gain?

anf. D 42*l.* E 26*l.* 5*s.* and F 57*l.* 15*s.*

3. A, P, and Q, trading together, had the misfortune to lose 57*l.* 12*s.* A's stock was 56*l.* P's 60*l.* and Q's 100*l.* 10*s.* how much must each person sustain of the loss?

anf. A 14*l.* 17*s.* 11*d.* $2\frac{1}{3}\frac{8}{1}\frac{6}{3}qrs.$ P 15*l.* 19*s.* 3*d.* $0\frac{2}{4}\frac{1}{3}\frac{8}{1}qr.$ and Q 26*l.* 14*s.* 9*d.* $0\frac{2}{4}\frac{5}{3}\frac{2}{1}qr.$

4. Four merchants, M, N, O, and P, whose stock is 1200*l.*

of which M put in 150*l.* N 200*l.* O 400*l.* 18*s.* and P the rest; gain by trading 207*l.* 19*s.* I demand each partner's share thereof;

ans. M 25*l.* 19*s.* $10\frac{1}{2}$*d.* N 34*l.* 13*s* 2*d.* O 69*l.* 9*s.* 5*d.* $1\frac{181}{250}$*qr.* and P 77*l.* 16*s.* 6*d.* $0\frac{69}{250}$*qr.*

5. A, B, C, and D, make a stock of 1800*l.* and in the course of their trading they gain 202*l.* 10*s.* of which A received 75*l.* B 60*l.* C 45*l.* and D 22*l.* 10*s.* required each man's stock?

ans. A's stock 666*l.* 13*s.* 4*d.* B's 533*l.* 6*s.* 8*d.* C's 400*l.* and D's 200*l.*

6. Three merchants, A, B, and C, bought a West India ship; whereof A paid $\frac{3}{5}$, B $\frac{4}{14}$, and C the rest, which amounted to 786*l.* 18*s.* 10*d.* in a trading voyage, of two years, they gain 1786*l.* after paying all expences; how much is each man's share of the gain? *ans.* A's share 1071*l.* 12*s.* B's 476*l.* 5*s.* 4*s.* and C's 238*l.* 2*s.* 8*d.*

7. D, E, and F, put into trade equal sums of money; they gain 1000*l.* of which D was to have 6 per cent, because he acted as agent for the whole: E and F were only to receive 4 per cent each: I demand each person's share of the gain?

ans. D's share 428*l.* 11*s.* $5\frac{1}{7}$*d.* E's 285*l.* 14*s.* $3\frac{3}{7}$*d.* and F's 285*l.* 14*s.* $3\frac{3}{7}$*d.*

COMPANY *with* TIME.

BY this rule the gain or loss is divided among the partners, in proportion to the sum, and the time of its continuance, in the joint stock.

RULE.—Multiply each man's stock by the time of its continuance: then say, as the sum of these products, is to the gain or loss; so is each of these products, to each man's gain or loss.

1. Two persons, A and B, enter into partnership: A put into the stock 97*l.* for 6 months: B 100*l.* for 8 months: they trade, and gain, 40*l.* 18*s.* required each man's share of the gain?

ans. A's share 17*l.* 4*s.* 5*d.* $3\frac{139}{691}$*qrs.* and B's 23*l.* 13*s.* 6*d.* $0\frac{552}{691}$*qr.*

2. D puts into company 700*l.* for 11 months: E 472*l.* 18*s.* for 13 months; and F 601*l.* for 12 months: they gain 672*l.* 18*s.* 10*d.* I demand each person's share of the gain?

ans. D's share 246*l.* 0*s.* 10*d.* $3\frac{204809}{210597}$*qrs.* E's 196*l.* 8*s.* 10*d.* $1\frac{182203}{210597}$*qr.* and F's 230*l.* 9*s.* 0*d.* $2\frac{34182}{210597}$*qrs.*

3. Three persons agree to make a joint stock: A puts in 170*l.* for 12 months: B 300 guineas for 10 months: and C 237*l.* 10*s.* for 6 months: they gain 487*l.* 19*s.* 8*d.* how much did each man receive of the gain? *ans.* A 150*l.* 9*s.* 9*d.* $1\frac{275}{441}$*qr.* B 232*l.* 7*s.* 5*d.* $2\frac{42}{441}$*qrs.* and C 105*l.* 2*s.* 5*d.* $0\frac{124}{441}$*qr.*

4. Four merchants, P, Q, R, and S, agree to trade together for 18 months; P puts in 300*l.* and at 8 months' end 400*l.* more; Q puts in 600*l.* at the end of 4 months takes out 200*l.* and at the end of other 6 months, puts in 300*l.* R puts in 700*l.* which continues the whole time; and S puts in 275*l.* and at the end of 12 months 167*l.* more; they gain 1000*l.* what is each man's share?

ans. P's share 245*l.* 1*s.* 11*d.* $2\frac{94}{799}$*qrs.* Q's 271*l.* 3*s.* 5*d.* $1\frac{325}{799}$*qr.* R's 328*l.* 10*s.* 8*d.* $2\frac{194}{799}$*qrs.* and S's 155*l.* 3*s.* 10*d.* $2\frac{186}{799}$*qrs.*

EXCHANGE.

EXCHANGE is the paying, or receiving, of cash in one country, for an equal sum in another.

The par of exchange is the real worth of money in one country, compared with that of another.

The course of exchange is sometimes above, and sometimes below par, according to the circumstances of trade between the two nations.

The agio is the difference between the bank and current money: The bank money, in some places, being of more value than the currency.

In those places where the agio is used, the exchange is always made with the bank.

With FRANCE.

England exchanges with France upon the imaginary crown of three livres Tournois.

					s.	d.
12 Deniers	make	1 Sol	=		0	$0\frac{39}{80}$
20 Sols		1 Livre	=		0	$9\frac{3}{4}$
3 Livres		1 Crown	=		2	$5\frac{1}{4}$
8 Crowns		1 Lous d'ore	=		19	6

					s.	d.
			ALSO			
3 Deniers	} make {	1 Liard	=		0	$0\frac{1}{8}$
5 Liards	} make {	1 Patard	=		0	$0\frac{5}{8}$
20 Patards	} make {	1 Florin	=		1	$0\frac{1}{2}$

Note. The real French crown weighs 19 *dwts.* $14\frac{1}{2}$*grs.* and its value is 5*s.* $4\frac{17}{21}$*d.*

Note. The following queſtions are ſolved by the Rule of Three.

1. How much ſterling will 7874 livres, 10 ſols, amount to, exchange at $31\frac{1}{2}$*d.* per crown, Tournois?

anſ. 344*l.* 10*s.* $2\frac{1}{4}$*d.*

2. How many livres will 344*l.* 10*s.* $2\frac{1}{4}$*d.* ſterling amount to, exchange at $31\frac{1}{2}$*d.* per crown, or ecu?

anſ. 7874 *livres*, 10 *ſols.*

3. Paris remits 3419 crowns, 49 ſols to London; how much ſterling muſt be received there, exchange at $30\frac{7}{8}$*d.* per ecu?

anſ. 439*l.* 18*s.* 10*d.* $3\frac{41}{120}$*qrs.*

4. London remits to Paris 439*l.* 18*s.* 10*d.* $3\frac{41}{120}$*qrs.* ſterling; how many crowns muſt be received there, exchange at $30\frac{7}{8}$*d.* per crown? *anſ.* 3419 *crowns*, 49 *ſols.*

With SPAIN.

In the principal towns of Spain they keep their accounts in piaſters, rials, and mervadies; and exchange with Britain, commonly on the piaſter, whoſe par is about 3*s.* 7*d.* and ſometimes on the ducat, whoſe par is about 4*s.* $11\frac{1}{4}$*d.*

				s.	d.	qr.
		1 Mervadie	=	0	0	$0\frac{41}{64}$
34 Mervadies	} make {	1 Rial	=	0	5	$1\frac{1}{2}$
8 Rials	} make {	1 Piaſter	=	3	7	0
375 Mervadies	} make {	1 Ducat	=	4	11	$1\frac{9}{64}$
		1 Piſtole	=	17	11	0

1. How much ſterling will I receive for 1728 piaſters, exchange at $44\frac{3}{8}$*d.* per piaſter? *anſ.* 323*l.* 2*s.*

2. How many piaſters muſt be given for 323*l.* 2*s.* exchange at $44\frac{3}{8}$*d.* per piaſter? *anſ.* 1728 *piaſters.*

3. An Engliſh gentleman being in Spain, wants to exchange a bill of 700*l.* ſterling, into ducats, at 4*s.* 9*d.* each; how many will he receive? *anſ.* $2947\frac{7}{19}$ *ducats.*

4. In 17046 pieces of eight, each 40½*d.* how many pounds ſterling? *anſ.* 2876*l.* 10*s.* 3*d.*

5. Change 2876*l.* 10*s.* 3*d.* into pieces of eight, at 40½*d.* each? *anſ.* 17046.

Malaga, December, 24th, 1783.

Invoice of wine laden by George Jackſon, on board the Succeſs, Thomas Meanwell, maſter, for account and riſque, as per advice from William Merchant in Briſtol, the mark as per margin.

	pia.	*ri.*	*me.*
To coſt of 12 pipes of wine, Bot. of Sig. Minho, at 26 *piaſters* per pipe	312	0	0
To cuſtom at 10 rials per pipe	15	0	0
W. M. To porterage, and boat-hire	7	6	0
To brokerage, at ¼ per cent	0	6	23
To commiſſion, at 2 per cent	6	5	23
Piaſters	342	2	12

Errors excepted. *George Jackſon.*

Required how much ſterling the above invoice will amount to, exchange at 45⅛*d.* per piaſter?

anſ. 64*l.* 7*s.* 2$\frac{3}{9}$*d.*

With PORTUGAL.

In Portugal they keep their accounts in reas and milreas: and exchange upon the milrea, which is imaginary, whoſe par is 5*s.* 7½*d.*

				s.	*d*
		1 Rea	=	0	$0\frac{27}{400}$
400 Reas	make	1 Cruſadoe	=	2	3
1000 Reas	make	1 Milrea	=	5	7½

1. How much ſterling money will pay a bill of 825 milreas, exchange at 64⅛*d.* ſter. per milrea? *anſ.* 222*l.* 2*s.* 11*d.* 2½*grs.*

2. How many milreas will 222*l.* 2*s.* 11*d.* 2½*grs.* amount to, exchange at 64⅛*d.* per milrea? *anſ.* 825 *milreas.*

3. A merchant in London draws upon his correſpondent at Liſbon, for 759*l.* how many milreas will the merchant's agent receive, exchange at 5*s.* 1½*d.* ſterling per milrea?

anſ. 2961$\frac{19}{47}$ *milreas.*

4. How much ſterling will 2961$\frac{19}{47}$ milreas amount to, exchange at 5*s.* 1½*d.* per milrea? *anſ.* 759*l.*

With HOLLAND, FLANDERS, *and* GERMANY.

They keep their accounts in theſe places, ſometimes in pounds, ſhillings, and pence, as in England; and ſometimes in guilders, ſtivers, and pennings; and exchange with Britain on the pound Flemiſh, whoſe par is 36*s.* 6*d.* Flemiſh banco, or 38*s.* $1\frac{1}{2}$*d.* currency, per pound ſterling in Holland; but in Hamburgh 35*s.* $6\frac{3}{4}$*d.* At the bank of Amſterdam, bills are negociated by transfers, without paying any caſh, which ſerves greatly to expedite buſineſs, ſo that bank payments are reckoned from 4 to 6 per cent. better than payments in caſh. The caſh of Holland Flanders, and Germany, is diſtinguiſhed by the name Flemiſh, in the ſame manner as Engliſh money is diſtinguiſhed by the name ſterling.

The following TABLE *ſhews the value of the current money.*

				l.	*s.*	*d.*	*qrs.*
8 Pennings	make	1 grot, or penny	=	0	0	0	$2\frac{4}{5}$
16 Pennings		1 ſtiver —	=	0	0	1	$0\frac{8}{25}$
6 Stivers		1 ſhilling flemiſh	=	0	0	6	$1\frac{2}{25}$
20 Stivers		1 guilder or florin	=	0	1	9	$2\frac{1}{5}$
6 Guilders		1 pound flemiſh	=	0	10	9	$2\frac{2}{5}$
5 Guilders		1 ducat, ſilver	=	0	9	0	0
$2\frac{1}{2}$ Guilders		1 rixdollar —	=	0	4	6	0
20 Guilders		1 ducat, gold	=	1	16	0	0.

In HAMBURGH.

6 Phennings	make	1 Grot, or penny	=	0	0	$0\frac{9}{16}$
12 Phennings		1 Shilling lub	=	0	1	$1\frac{1}{8}$
6 Shillings lubs		1 Shilling flemiſh	=	0	6	$\frac{3}{4}$
16 Shillings lubs		1 Mark —	=	1	6	
2 Marks		1 Dollar —	=	3	0	
3 Marks		1 Rixdollar —	=	4	6	
$6\frac{1}{4}$ Marks		1 Ducat —	=	9	$4\frac{1}{2}$	
$7\frac{1}{2}$ Marks		1 Pound flemiſh	=	11	3	

1. How much ſterling money will a bill of 528*l.* 5*marks.* 10*s. lubs.* amount to, exchange at 35*s.* 3*d.* flemiſh per *l.* ſterling? *anſ.* 300*l.*

2. How many pounds flemiſh will 300*l.* ſterling amount to, exchange at 35*s.* 3*d.* flemiſh per *l.* ſterling?

anſ. 528*l.* 5*marks*, 10*s. lubs.*

3. How many guilders will I receive for 100*l.* sterling, exchange at 36*s.* 6*d.* flemish per pound sterling? *ans.* 1095 *guilders.*

4. How much sterling will a bill of 1095 guilders amount to, exchange at 36*s.* 6*d.* flemish per *l.* sterling?

ans. 100*l.* *sterling.*

To turn currency into bank money, say, as 100 with the agio added, is to 100; so is the given currency, to its value in bank money.

5. Change 1007 guilders currency into bank money, agio at $4\frac{1}{2}$ per cent. *ans.* $963\frac{133}{209}$.

6. Change $963\frac{133}{209}$ guilders bank money into currency, agio $4\frac{1}{2}$ per cent. *ans.* 1007.

7. How much sterling will a bill of 17489 stivers currency amount to, exchange at $34\frac{7}{8}$*s.* per *l.* sterling, the agio 6 per cent? *ans.* 78*l.* 16*s.* 11*d.* $2\frac{8822}{14787}$*qrs.*

8. How many stivers currency will 78*l.* 16*s.* 11*d* $2\frac{8822}{14787}$*qrs.* sterling amount to, agio at 6 per cent, and the exchange at $34\frac{7}{8}$*s.* flemish per *l.* sterling? *ans.* 17489.

9. How many rixdollars will 1000*l.* sterling amount to, exchange at 38*s.* 7*d.* flemish per *l.* sterling? *ans.* 4630 *rixdollars.*

10. How much sterling will be received for 4630 rixdollars. exchange at 38*s.* 7*d.* per *l.* *ans.* 1000*l*,

Hamburgh, March 19*th*, 1784.

11. Invoice of 20 pieces of cambric, and 15 pieces of holland, laden by me John Careful, on board the Swallow, Roger Seaman, master, upon the account and risque of James Trader, merchant, in Newcastle, under the mark per margin. The contents, costs, and charges, as follow, viz.

	guil.	*st.*	*p.*
20 Pieces of cambric, qt. $617\frac{3}{4}$ ells English, at 1 *guil.* 6 *stivers* per ell	803	1	8
15 Pieces of holland, qt. 572 ells English, at 1 *guil.* 16 *stivers* per ell	1029	12	0

J. T. CHARGES.

	guil.	*st.*			
To custom and brokerage of the cambric, at 5 *guil.* per piece	100	0			
To ditto holland, at 6 *guil.* per piece	90	0			
To charges in buying, and warehouse room, &c.	7	10			
To boatage and porterage, &c.	4	7			
			201	17	0
			2034	10	8

	guil.	ſt.	p.
	2034	10	8
To my commiſſion, at $2\frac{1}{2}$ per cent	50	17	$4\frac{1}{2}$
	2085	7	$12\frac{1}{2}$

Errors excepted.

From your humble ſervant,

John Careful.

How much ſterling will the invoice amount to, exchange at 35*s.* 9*d.* flemiſh per *l.* ſterling? *anſ.* 194*l.* 8*s.* $10\frac{4}{143}$*d.*

With VENICE.

There are three kinds of money at Venice of different values, *viz.* bank money, currency, and picoli. The bank money is 20 per cent better than the currency, and the currency is 20 per cent better than the picoli.

They exchange on the ducat banco, whoſe par is 4*s.* 4*d.* ſterling.

			s.	d.
6 Soldi	make	1 Soldi =	0	$0\frac{60}{181}$
24 Groſs	make	1 Groſs =	0	$1\frac{179}{181}$
	make	1 Ducat =	3	$9\frac{113}{181}$

Current Money.			s.	d.
$5\frac{1}{0}$ Soldi	make	1 Soldi =	0	$0\frac{27}{50}$
24 Groſs	make	1 Groſs =	0	$1\frac{157}{1250}$
	make	1 Ducat =	3	$5\frac{17}{250}$

Note. Accounts are kept at St George's bank at Genoa, and alſo at Leghorn, in deniers, ſols, and livres, as in France; but they exchange upon the piaſter, which at Genoa is 5 livres, and at Leghorn 6.

1. How much ſterling will anſwer a bill of 476 ducats, bank money, exchange at $50\frac{1}{2}$*d.* per ducat? *anſ.* 100*l.* 3*s.* 2*d.*

2. How many ducats, bank money, will be received for 100*l.* 3*s.* 2*d.* ſterling, exchange at $50\frac{1}{2}$*d.* per ducat? *anſ.* 476 *ducats.*

3. How much ſterling muſt be given for 1000 ducats currency, exchange at $50\frac{1}{8}$*d.* per ducat banco?

anſ. 174*l.* 0*s.* 10*d.* $3\frac{1}{7}$*qrs.*

4. How many ducats currency, will ſatisfy a draught of 174*l.* 0*s.* 10*d.* $3\frac{1}{7}$*qrs.* ſterling, exchange at $50\frac{1}{8}$*d.* per ducat?

anſ. 1000 *ducats.*

5. How many livres will be received in Leghorn for 178*l.* 17*s.* ſterling, exchange at 4*s.* $4\frac{1}{2}$*d.* per piaſter?

anſ. $4905\frac{3}{7}$ *livres.*

6. Genoa is indebted to England 17867 livres, 14 sols, how much sterling has England a right to receive, exchange at 4*s.* $3\frac{1}{8}$*d.* per piaster? *anſ.* 731*l.* 9*s.* 2*d.* $0\frac{61}{400}$*qr.*

With IRELAND, *and the* WEST INDIES.

Accounts are kept in theſe places in pounds, ſhillings, and pence, as in England, and they exchange on the 100*l.* ſterling; the par is about 108*l.* 6*s.* 8*l.* Iriſh, per 100*l.* ſterling; but the courſe of exchange is from 5 to 12 per cent, according to the balance of trade. In the Weſt Indies the ſcarcity of caſh has forced them to make uſe of paper currency, which ſuffers a great diſcount, 140*l.* of it being given for 100*l.* ſterling, and often more, according the nature of the trade.

1. How much ſterling will 1407*l.* 15*s.* Weſt India currency amount to, exchange at 142*l.* per cent.

anſ. 991*l.* 7*s.* 5*d.* $2\frac{3}{71}$*qrs.*

2. Dublin remits to London 1250*l.* Iriſh; how much ſterling will it amount to, exchange at $110\frac{3}{4}$*l.* per cent.

anſ. 1132*l.* $10\frac{50}{893}$*s.*

3. How much muſt be received at Dublin for 1132*l.* $10\frac{50}{893}$*s.* ſterling, exchange at $110\frac{3}{4}$*l.* per cent. *anſ.* 1250*l.*

4. Bought a quantity of ſugar at Jamaica, for 748*l.* currency, paid for factorage and other charges $5\frac{1}{2}$*l.* per cent, how much ſterling will the ſugar come to, exchange at $138\frac{7}{8}$*l.* per cent.

anſ. 568*l.* 4*s.* $9\frac{133}{171}$*d.*

Jamaica, December 19th, 1785.

5. Invoice of 15 hogſheads of ſugar, and 10 puncheons of rum, laden by me Robert Factor, on board the Weſt Indian, Theobald Jenſon, commander, for the account and riſque of George Atkinſon, Eſq. merchant in London, marked as per margin.

	cwt.	*qrs.*	*lb.*	
15 *Hhds.* of ſugar, wt.	157	3		groſs, tare 18 per *cwt.*
	25	1	$11\frac{1}{2}$	tare.
	132	1	$16\frac{1}{2}$	neat, at 4*l.* 7*s.* per *cwt.* currency

	£	*s.*	*d.*
	575	18	$6\frac{1}{4}$
10 Puncheons rum, at 14*l.* 10*s.* per puncheon, currency	145	0	0
Charges, and my commiſſion on the whole, at $4\frac{3}{4}$*l.* per cent.	34	4	$10\frac{1}{2}$
	755	3	$5\frac{1}{4}$

C. A.

How much ſterling will the foregoing invoice amount to, exchange at 140*l.* per cent. *anſ.* 539*l.* 8*s.* $2\frac{1}{13}$*d.*

With DENMARK *and* NORWAY.

Accounts are kept in thoſe places in rixdollars, marks, and ſhillings; and they exchange upon the rixdollar, whoſe par is 4*s.* 6*d.* ſterling.

				s.	*d.*
3 Penins	make	1 Daniſh ſhilling	=	0	$0\frac{9}{16}$
16 Daniſh ſhillings	make	1 Mark	=	0	9
4 Marks	make	1 Dollar	=	3	0
$1\frac{1}{2}$ Dollar	make	1 Rixdollar	=	4	6
$1\frac{1}{3}$ Rixdollar	make	1 Double Rixdollar	=	6	0

1. To how much ſterling will 854 rixdollars, 3 marks, amount to, exchange at 4*s.* 7*d.* ſterling per rixdollar?

anſ. 195*l.* 16*s.* $5\frac{1}{2}$*d.*

2. How many rixdollars will 195*l.* 16*s.* $5\frac{1}{2}$*d.* amount to, exchange at 4*s.* 7*d.* per rixdollar?

anſ. 854 *rixdollars*, 3 *marks.*

With SWEDEN.

In Sweden they keep their accounts in copper rixdollars, copper dollars, copper marks, and runſticks; they exchange with Holland upon the copper mark, whoſe par is $1\frac{5}{9}$*d.* but when they exchange directly with England, it is upon the copper dollar, whoſe par is $6\frac{3}{4}$*d.*

				s.	*d.*
8 Runſticks	make	1 Copper mark	=	0	$1\frac{5}{9}$
4 Copper marks	make	1 Copper dollar	=	0	$6\frac{3}{4}$
6 Copper dollars	make	1 Copper rixdollar	=	3	$1\frac{1}{2}$
1 Copper dollar	make	$1\frac{1}{3}$ Silver mark	=	0	$4\frac{3}{4}$
3 Silver marks	make	1 Caroline	=	1	2
4 Silver marks	make	1 Silver dollar	=	1	$6\frac{3}{4}$
3 Silver dollars	make	1 Silver rixdollar	=	4	8

1. Change 7148 *co. rix.* 2 *do.* 5 *run.* to ſterling money, at $7\frac{1}{4}$*d.* per copper dollar? *anſ.* 1384*l.* 19*s.* 10*d.* $2\frac{3}{13}$*qrs.*

2. How much ſterling will a bill of 18740 copper dollars amount to, exchange at $40\frac{7}{8}$ dollars per *l.* ſterling.

anſ. 458*l.* 9*s.* $5\frac{3}{89}$*d.*

3. In 458*l.* 9*s.* $5\frac{3}{89}$*d.* ſterling, how many copper dollars, exchange at $40\frac{7}{8}$ dollars per pound? *anſ.* 18740 *co. dollars.*

With DANTZIC, *and* KONINGSBERG.

These places exchange, for the moſt part, with Britain, by way of Amſterdam and Hamburgh; they exchange with Holland and Hamburgh by an uncertain number of Poliſh groſs for a pound Flemiſh, or rixdollar. When they exchange directly with Great Britain, it is upon the florin, whoſe par is 1*s.* 2*d.* ſterling.

					s.	*d.*
4 Deniers, or pence	make	1 Shelon	=		0	$0\frac{7}{45}$
3 Shelons		1 Groſhen	=		0	$0\frac{7}{15}$
5 Groſhens		1 Couſtic	=		0	$2\frac{1}{3}$
3 Couſtics		1 Truſe	=		0	7
2 Truſes		1 Florin or guilder	=		1	2
3 Florins		1 Rixdollar	=		3	6
$2\frac{2}{3}$ Rixdollars		1 Ducat	=		9	4
$1\frac{7}{8}$ Ducat		1 Frederic d'or	=		17	6

Note. The ducat is rated at 9*s.* 4*d.* ſterling, but it is only worth 9*s.*

1. How many rixdollars will anſwer a bill of 4764 florins, exchange at 125 groſhens per rixdollar of Hamburgh?

anſ. $1143\frac{9}{25}$.

2. How many florins will ſatisfy a draught of 741*l.* 19*s.* 6*d.* ſterling, exchange at $16\frac{5}{8}d.$ per florin? *anſ.* $10711\frac{29}{133}$ *fl.*

3. How much ſterling will $10711\frac{29}{133}$ florins amount to, exchange at $16\frac{5}{8}d.$ ſterling per florin? *anſ.* 741*l.* 19*s.* 6*d.*

With RUSSIA.

Ruſſia exchanges with England by the medium of Holland, very ſeldom directly; they exchange upon the ruble, whoſe par is 4*s.* 6*d.* ſterling.

					s.	*d.*
2 Poluſcas	make	1 Moſcoſque	—	=	0	$0\frac{81}{100}$
2 Moſcoſques		1 Copeack	—	=	0	$0\frac{81}{110}$
3 Copeacks		1 Altin	—	=	0	$1\frac{1}{10}$
$3\frac{1}{3}$ Altins		1 Grive	—	=	0	$5\frac{2}{5}$
$2\frac{1}{2}$ Grives		1 Polpoltin	—	=	1	$1\frac{1}{2}$
2 Polpoltins		1 Poltin	—	=	2	3
2 Poltins		1 Ruble	—	=	4	6
2 Rubles		1 Ducat	—	=	9	0

1. In 14867 rubles, how much ſterling, exchange at $57\frac{1}{4}d.$ ſterling per ruble? *anſ.* 3546*l.* 7*s.* $11\frac{1}{4}d.$

2. In 3546*l.* 7*s.* $11\frac{1}{4}d.$ ſterling, how many rubles, exchange at $57\frac{1}{4}d.$ per ruble? *anſ.* 14867 *rubles.*

3. To how much ſterling will a quantity of hemp, whoſe value is 17864 rubles, 67 copecks, amount to, exchange at $58\frac{7}{8}d.$ ſterling per ruble? *anſ.* 4382*l.* 8*s.* 6*d.* $1\frac{157}{1000}qr.$

4. How many rubles will 4382*l.* 8*s.* 6*d.* $1\frac{157}{1000}qr.$ ſterling come to, exchange at $58\frac{7}{8}d.$ per ruble?

anſ. 17864 *rubles*, 67 *copeaks*.

Note. The following ſpecimen of accounts ſhews how Britain exchanges with other countries through the medium of Holland.

Mr T. Pumſeal's account of Amſterdam, agent for Mr Goodman of Hull, for goods ſent by Mr. Traffic of Riga, to the ſaid Mr Goodman.

Dr. Mr Goodman, of Hull				Contra			Cr.		
1784.				1784.					
June 2. To 749 rixdollars drawn on me by Mr Traffic on your account, at 50 *ſtiv.* per rixdollar.	1872	10	0	June 16. By 178*l.* at 35*s.* 1¼*d.* drawn on you in favour of Mr N. M. in London. Agio at $3\frac{1}{16}$ per cent	1875 62	13 2	8 10
Aug. 19. To 1017 drawn for by ditto, at ditto.	2542	10	0	Aug. 25. By 330*l.* at 35*s.* to Mr J. D. Agio at 3½ per cent	3465 121	0 5	0 8
Sept. 20. To 1076½ drawn for by ditto, at ditto	2691	5	0	Oct. 5. By 140*l.* at 34*s.* 9¾*d.* to H. H. Agio at $3\frac{1}{16}$ per cent	1461 57	5 10	0 12
To my commiſſion on the whole, at 10 ſtivers per cent.	35	10	0		7042	17	6
To brokerage on 7042 *guil.* 17 *ſt.* 6 *p.* at 10 *ſt.* per thouſand.	3	10	7	By balance due to me	108	5	2
To poſtage of letters	5	16	7	*Guilders.*	7151	2	8
Errors excepted. *Amſterdam, Oct.* 12, 1784.	7151	2	8				

ARBITRATION.

ARBITRATION teaches how to negociate bills through ſeveral places. As the courſe of exchange is continually varying, the merchant ought to have an extenſive knowledge concerning the rate of exchange in foreign parts; that he may underſtand how to remit and draw to the beſt advantage.

SIMPLE ARBITRATION.

In ſimple arbitration the rates of exchange from one place to two others are given; to find the arbitrated rate between the *two* places.

1. If the exchange between Spain and London be 42*d.* ſterling per piaſter, and the exchange between Spain and Hamburgh 70$\frac{7}{8}$*d.* flemiſh per piaſter; what is the arbitrated rate between Hamburgh and London?

anſ. 33*s.* 9*d. flemiſh per l. ſterling.*

2. If the rate of exchange between Hamburgh and Spain be 70$\frac{7}{8}$*d.* flemiſh per piaſter, and the exchange between Hamburgh and London 33*s.* 9*d.* flemiſh per *l.* ſterling; what is the par of arbitration between Spain and London?

anſ. 42*d. ſterling per piaſter.*

3*. If the exchange between London and Paris be 52*d.* ſterling per crown, and to Amſterdam 40$\frac{5}{8}$*d.* flemiſh per *l.* ſterling; and if by advice from Holland to France, the courſe of exchange between Amſterdam and Paris be fallen to 52*d.* flemiſh, per crown; what may be gained per cent, by drawing on the one place and remitting to the other.

anſ. 3*l.* 16*s.* 11$\frac{1}{13}$*d.*

4. Paris draws upon London for 3600 crowns, at 55*d.* ſterling, per crown; for which London draws upon Paris at 56*d.* ſterling per crown, and is allowed $\frac{1}{2}$ per cent, for commiſſion; whether did Paris gain or loſe by this tranſaction?

anſ. 46 $\frac{7}{13}$*crs. gained by Paris.*

5. Holland was ordered to remit to Spain, at 94$\frac{3}{4}$*d.* Flemiſh

* MAIR and HUTTON give different anſwers to this queſtion, the reaſon is, Mair draws on Paris for 100*l.* and then remits to Amſterdam; but Hutton remits 100*l.* to Amſterdam, and then draws upon Paris.

Mair's anſwer is 3*l.* 14*s.* 0$\frac{8}{9}$*d.*

Hutton's anſwer is 3*l.* 16*s.* 11$\frac{1}{13}$*d.*

per ducat; now if the exchange between London and Amſterdam be 430*d.* flemiſh per *l.* ſterling; and between London and Spain 38*d.* ſterling per piaſter, how much will Holland gain or loſe per cent, by remitting firſt to London and then to Spain?

anſ. 18*s.* 8¼*d. gain.*

COMPOUND ARBITRATION.

COMPOUND Arbitration is when the rate of exchange between three or more places is given; to find how much a remittance paſſing through them will amount to.

RULE.—Diſtinguiſh the rates into antecedents and conſequents, and place the antecedents in one row and the conſequents in another, oppoſite each other, ſo that each conſequent may be of the ſame name with the next antecedent, and the firſt antecedent with the laſt conſequent; which muſt be the ſum whoſe value in exchange is required. If there be a fraction in any of the numbers, multiply both the antecedent and the conſequent by the denominator; and if the ſame number be in both antecedent and conſequent, it may be left out; then multiply the antecedents continually together for a diviſor, and the conſequents for a dividend; divide, and the quotient will be the value of the ſum required.

1. London was ordered to remit 1500*l.* ſterling to Spain, by the way of Amſterdam, at 43[illegible]*d* flemiſh per *l.* ſterling; thence to France, at 58 grots per crown; thence to Venice at 100 crowns per 60 ducats; and from Venice to Spain, at 360 mervadies per ducat; how many piaſters will it amount to in Spain?

anſ. 8625$\frac{175}{191}$ *piaſters.*

2. Paris was ordered to remit to Holland 546 crowns; but not liking the direct exchange, they are firſt ſent to England, at 30*d.* per crown; from thence to Italy, at 65*d.* per ſtamp crown; from Italy to Venice, at a 100 ſtamp crowns per 140 ducats: from Venice to Leghorn, at 100 ducats per 100 piaſters; and from Leghorn to Holland, at 86*d.* flemiſh per piaſter: how many pence will be received at Holland?

anſ. 30340$\frac{3}{4}$ *pence.*

3. A merchant in London wants to draw upon Leghorn for 2040 piaſters, from whence he has advice that he can draw at 50*d.* per piaſter, but not chuſing the direct rate, they are ordered firſt to Venice, at 94 piaſters per 100 ducats; thence to

Spain, at 320 mervadies per ducat; thence to Portugal, at 630 reas per 272 mervadies; thence to Holland, at 50*d.* flemiſh per 400 reas; thence to France, at 56*d.* per crown; and laſtly, to Britain, at 31½*d.* ſterling per crown; now ſuppoſing he pays ½ per cent for commiſſion at each place, how much will the circular remittance be better than the direct?

anſ. 32*l.* 2*s.* 1·1½*d. nearly.*

4. A merchant in Holland was ordered to remit to London 1500*l.* flemiſh at 36*s.* 9$\frac{1}{15}$*d.* flemiſh per *l.* ſterling; but reſolving to try the circular way, he ſends them firſt to Paris, at 56*d.* per crown tournois; thence to Italy, at 100 crowns per 56 ducats; thence to Hamburgh, at 100*d.* per ducat; thence to Portugal, at 45*d.* per 400 reas; and from thence to London, at 5*s.* 3*d.* per milrea; now ſuppoſing ½ per cent for commiſſion was allowed at each place; how much will be gained by the circular remittance? *anſ.* 8*l.* 14*s.* 11½*d.*

ALLIGATION.

ALLIGATION teaches how to mix different ſorts of ſimples together, ſo that the compoſition may be of a mean quality, or price; and it is divided into four parts, called medial, alternate, partial, and total.

ALLIGATION MEDIAL.

BY this rule the mean price of any mixture is found, when the particular quantities, and their prices are given.

RULE.—Multiply each price by its quantity, and divide the ſum of the products by the ſum of the quantities; the quotient will be the mean rate of the mixture required.

1. A vintner mixes 17½ gallons of wine, at 6*s.* 4*d.* per gallon; with 20¾ gallons at 8*s.* 1*d.* per gallon; 14 gallons at 4*s.* 11¼*d.* and 27 gallons at 5*s.* 2*d.* what is a gallon of the mixture worth? *anſ.* 6*s.* 1*d.* 3$\frac{3}{11}$*qrs.*

2. A farmer mixes 17 buſhels of wheat at 6*s.* 8*d.* per buſhel, 16 buſhels of rye at 4*s.* 6*d.* 10 buſhels of barley at 4*s.* 3*d.* and 4 buſhels of peas at 2*s.* 10¾*d.* required the worth of a buſhel of the mixture? *anſ.* 5*s.* 1$\frac{6}{17}$*d. per buſhel.*

3. Of what fineneſs is the compoſition, that is made by mixing $2\frac{3}{4}$ *oz.* of gold of 21 carats fine, 4*oz.* of 22, 6*oz.* of $22\frac{1}{2}$, and $3\frac{3}{4}$*oz.* alloy? *anſ.* $17\frac{7}{13}$ *carats fine.*

Note. The fineneſs of alloy is reckoned nothing in mixtures of this kind.

4. A ſpirit-merchant mixes 19 gallons of coniac brandy, at 14*s.* 9*d.* per gallon, and 17 gallons of wine-brandy, at 11*s.* 2*d.* with 10 gallons of another ſort, at 8*s.* 10*d.* what is a gallon of the compoſition worth? *anſ.* 12*s.* 1*d.* $2\frac{16}{21}$*qrs.*

5. A malſter mixes 70 buſhels of malt, at 5*s.* 4*d.* per buſhel; 100 buſhels, at 6*s.* 1*d.* 50 buſhels, at 4*s.* 11*d.* and 37 buſhels, at 6*s.* 6*d.* per buſhel, what is the mixture rate of a buſhel?

anſ. 5*s.* 8*d.* $2\frac{46}{171}$*qrs.*

6. What is the price of a *cwt.* of the following compoſition, *viz.* 7 *cwt.* at 3*l.* 4*s.* 6*d.* per *cwt.* 10 *cwt.* at 1*l.* 19*s.* 10*d.* 6 *cwt.* at 2*l.* 10*s.* and 12 *cwt.* at 5*l.* *anſ.* 3*l.* 7*s.* 1*d.* $2\frac{2}{3}\frac{2}{3}$*qrs.*

ALLIGATION ALTERNATE.

By this rule we find the particular quantity of each of the ingredients, whoſe rates are given, that will compoſe a mixture at a given price.

RULE.—Reduce the rates to one denomination, and ſet them under one another; then link together each rate that is greater than the mixture price with one that is leſs; place the difference between the mixture rate, and that of each of the ingredients oppoſite the rate it is linked to; if only one difference be ſet againſt any rate, it is the quantity belonging to that rate; but if there be ſeveral, take their ſum for the proper quantity.

1. A grocer would mix ſugars, at 10*d.* 7*d.* 5*d.* and 4*d.* per *lib.* to make a quantity to ſell at 6*d.* per *lib.* how much of each ſort muſt be uſed?

anſ. 2*lib.* at 10*d.* 1*lib.* at 7*d.* 1*lib.* at 5*d.* and 4*lib.* at 4*d.* or any other quantities in the ſame proportion.

2. How much corn at 4*s.* 7*d.* 3*s.* 8*d.* 2*s.* 11*d.* 4*s.* and 3*s.* 1*d.* per buſhel, muſt be mixed together to make a compoſition worth 3*s.* 10*d.* per buſhel? *anſ.* 20 at 4*s.* 7*d.* 2 at 3*s.* 8*d.* 2 at 4*s.* 9 at 2*s.* 11*d.* and 9 at 3*s.* 1*d.*

3. Wanting to ſell brandy at 12*s.* 9*d.* per gallon, and having

ſeveral quantities worth 10*s* 6*d*. 9*s*. 11*d*. 11*s*. 4*d*. 12*s*. and 16*s*. per gallon; how much of each ſort muſt be uſed;

anſ. An equal quantity of the firſt four ſorts, and $2\frac{3}{7}$ times as much of the laſt.

4. A goldſmith has gold of 17, 19, $21\frac{1}{2}$, and 23 carats fine, out of which he wants to form a compoſition of 21 carats; how much of each ſort muſt be taken?

anſ. 1 at 17, $\frac{1}{2}$ at 19, 2 at $21\frac{1}{2}$, and 4 at 22, or any other quantities in the ſame proportion.

5. How much tea at 6*s*. 6*d*.—7*s*.—8*s*. 9*d*.—10*s*. 1*d*. and 12*s*. 1 1*d*. per *lib*. will compoſe a mixture worth 10*s*. 6*d*. per *lib*.

anſ. An equal quantity of the firſt four ſorts, and 4 times as much of the laſt.

ALLIGATION PARTIAL.

Alligation Partial is when the quantity of one of the ſimples is given, to find the ſeveral quantities of the reſt in proportion to the one limited.

RULE.—Find the difference between the mixture rate and each of the ſimples as in the laſt rule; then ſay, as the difference of that ſimple whoſe quantity is given, is to the given quantity; ſo is each of the other differences to its proper quantity.

1. How much tobacco at 15*d*. 18*d*. and 20*d*. per *lib*. muſt be mixed with 100 *lib*. at 2*s*. per *lib*. that the compoſition may be worth 19*d*. per *lib*. *anſ*. 125 at 15*d*. 25 at 18*d*. and 25 at 20*d*.

2. How many gallons of brandy, at 8*s*. 10*d*. and 11*s*. 2*d*. per gallon, muſt be mixed with 19 gallons at 15*s*. per gallon; that the mixture may be worth 12*s*. per gallon?

anſ. $14\frac{1}{4}$ at 8*s*. 10*d*. and $14\frac{1}{4}$ at 11*s*. 2*d*.

3. A merchant has 140 gallons of excellent gin, worth 14*s*. per gallon, but finding he cannot get that price, mixes it with other gin, at 8*s*. 9*s*. 6*d*. and 10*s*. per gallon; required how much of the laſt three ſorts he muſt take, that the mixture may be worth 10*s*. 6*d*. per gallon? *anſ*. $122\frac{1}{2}$ *gallons*.

ALLIGATION TOTAL.

Alligation Total is when the whole quantity of the ingredients to be mixed is given; to find each ingredient in proportion.

RULE.—Find the ſeveral differences as before; then ſay, as the ſum of the differences, is to the total quantity: ſo is each particular difference, to its proper quantity.

1. A diſtiller would make a compoſition of 555 gallons, worth 9*s.* 6*d.* a gallon; out of brandy at 12*s.* and 10*s.* 6*d.* per gallon, and cyder at 2*s.* per gallon: how much of each ſort muſt he take?

anſ. 225*gal.* at 12*s.* 225 at 10*s.* 6*d.* and 105*gal.* of cyder.

2. A goldſmith has gold of 18, 20, and 24 carats fine, out of which he wants to form a compoſition of 120*oz.* of 22 carats fine: required how much of each ſort he muſt take?

anſ. 24 at 18, 24 at 20, and 72 at 24.

3. A grocer has ſugar at 7*d.* 8*d.* and 11*d.* per *lib.* out of which he wants to make a *cwt.* worth 10*d.* per *lib.* how much of each ſort muſt be taken?

anſ. 16*lib.* at 7*d.* 16*lib.* at 8*d.* and 80*lib.* at 11*d.*

POSITION.

THIS rule is called Poſition, or Suppoſition, becauſe with the help of ſuppoſed numbers, and by reaſoning from them according to the nature of the queſtion, we find the true ones.

This rule is divided into two parts, called Single and Double: in the firſt of which, one ſuppoſition is uſed, and in the laſt two.

SINGLE POSITION.

RULE.—Suppoſe any number at pleaſure, and work with it as if it were the true one: then if the reſult be either too little or too much; ſay, as the reſult of the poſition, is to the poſition: ſo is the given number, to the number required.

1. Three perſons, A, B, and C, diſcourſing about their ages, find that A is as old again as B, and B is three times as old as C, and the ſum of their ages is 210 years: required each perſon's age?

anſ. A 126, B 63, and C 21.

2. Divide 10000 guineas among three perſons, William, Andrew, and James; and give William 645 more than Andrew, and Andrew 90 leſs than James.

anſ. Andrew 3088$\frac{1}{3}$, James 3178$\frac{1}{3}$, and William 3733$\frac{1}{3}$.

3. There is a ciſtern which has three cocks; the greateſt cock can empty it in 1$\frac{1}{2}$ hour, the ſecond in 3 hours, and the

third in $4\frac{1}{2}$ hours: how long would they take to empty it, if the cocks were all set open together? *anſ.* $\frac{9}{17}$*hour.* $= 49\frac{1}{17}$*minutes.*

4. What number is that, to which if the third, the fourth, and the ſeventh of itſelf, be added, the ſum will be 580?

anſ. 336.

5. One being aſked his age, ſaid, if $\frac{3}{4}$ of the time I have lived be multiplied by 8, and $\frac{5}{6}$ of the product be divided by 4, the quotient will be 45: what was his age? *anſ.* 60.

6. A gentlemen bought a coach, two horſes, and harneſs for 150*l.* the horſes coſt 5 times as much as the harneſs, and the coach as much as both horſes and harneſs: how much did he pay for each?

anſ. Harneſs 12*l.* 10*s.* horſes 62*l.* 10*s.* and coach 75*l.*

7. Divide 1085*l.* among four perſons, A, B, C, and D, in ſuch a manner, that B may have twice as much as A, and 60*l.* more: C three times as much as A, wanting 100*l.* and D five times as much as A, and 40*l.* more?

anſ. A $98\frac{7}{17}$*l.* B $257\frac{3}{17}$*l.* C $195\frac{10}{17}$*l.* and D $533\frac{2}{17}$*l.*

DOUBLE POSITION.

RULE.—Make two poſitions, and proceed with each according to the nature of the queſtion; find how much the reſults are different from the given number: then multiply each of theſe differences, or errors, by the other's poſition: and if the errors be both too much, or too little, divide the difference of the products by the difference of the errors: but if the one error be too much, and the other too little, divide the ſum of the products by the ſum of the errors, and the quotient will be the anſwer.

1. James, Andrew, and Thomas, playing at hazard for 1296 crowns, diſagreed about the game, and the money being upon the table, each ſeized as much as he could: Andrew got 60 more than James, and Thomas $\frac{1}{3}$ of both their ſums: required how much each got?

anſ. James got 510, Andrew 570, and Thomas 216.

2. A farmer ſold a number of ſheep and lambs to a butcher, for 128*l.* and was paid for every weather 20*s.* for every ewe 16*s.* and for every lamb 4*s.*—Now there were twice as many ewes as weathers, and as many lambs as both ewes and weathers: required how many there were of each ſort?

anſ. 40 weathers, 80 ewes, and 120 lambs.

3. When firſt the marriage knot was ty'd
Betwixt my wife and me,
My age did her's as far exceed
As three times three does three:
But after ten and half ten years,
We man and wife had been,
Her age proportion'd was to mine,
As eight is to ſixteen.
Now pray,
What were their ages on the wedding day?

anſ. He was 45, and ſhe 15.

4. A gentleman had two horſes, Cheſnut and Swift, and a ſaddle worth 50*l.* which ſet on the back of Cheſnut, makes his value double that of Swift; but ſet on the back of Swift, makes his value treble that of Cheſnut: required the value of each horſe? *anſ.* Cheſnut 30*l.* and Swift 40*l.*

5. A perſon bought Iriſh linen at 6*s.* per yard, and home-made linen at 3*s.* per yard; and paid 6*l.* 9*s.* for the whole, which was 32 yards: required how many yards there were of each ſort? *anſ.* 11*yds.* of Iriſh, and 21*yds.* of home made linen.

6. There is a fiſh, whoſe head is 9 inches long, the tail as long as the head, and half the body: and the body as long as both head and tail; required the length of the whole fiſh?

anſ. 72 *inches.*

7. A veſſel, that holds 60 gallons, has 4 cocks: if they all be ſet open at once, they will empty it in 24 hours; now the ſecond cock can empty twice as much as the firſt; and the third three times as much as the firſt: and the fourth 5 times as much as the firſt, during the ſame time: required how many gallons are emptied by each cock? *anſ.* $5\frac{1}{31}$*gal.* by the firſt cock, $10\frac{10}{31}$ by the ſecond, $16\frac{4}{31}$ by the third, and $27\frac{15}{31}$ by the fourth.

8. Four men have each a ſum of money, which altogether make 250*l.* if to the firſt man's money be added 8*l.* it will make juſt as much as the ſecond man's money decreaſed by 8*l.* and as much as 8 times the third man's money, and but $\frac{1}{9}$ of the fourth man's money; how much had each man?

anſ. Firſt $16\frac{56}{81}$*l.* ſecond $32\frac{56}{81}$*l.* third $3\frac{7}{81}$*l.* and fourth $197\frac{44}{81}$*l.*

9. A gentleman gave to A and B 100*l.* for the ranſom of a priſoner; but they falling out about parting the money, each ſnatched up as much as he could: upon agreement, B gave A $\frac{1}{7}$ of what he ſnatched up, and A gave B $\frac{1}{3}$ of what he ſnatched

up; this done, each had 50*l.* required how much each snatched up? *anſ.* A 64*l.* 5*s.* 8$\frac{4}{7}$*d.* and B 35*l.* 14*s.* 3$\frac{3}{7}$*d.*

ARITHMETICAL PROGRESSION.

AN Arithmetical Progreſſion, or Series, is a rank of numbers which continually increaſe or decreaſe, by the adding or ſubtracting of equal numbers; called the ratios, or common differences; thus,

0, 4, 8, 12, 16, 20, } Common difference is 4
20, 16, 12, 8, 4, 0, }

2, 4, 6, 8, 10, 12, } Common difference is 2
12, 10, 8, 6, 4, 2, }

In an arithmetical ſeries the ſum of the extremes is equal to the ſum of any two means equally diſtant from the extremes; thus, 2 + 12 = 4 + 10 = 6 + 8. And when the number of terms are odd, the ſum of the extremes is equal to double the middle term; thus in the ſeries 3, 5, 7, 9, 11, 13, 15, the double of 9 = 18 = 3 + 15 = 5 + 13 = 7 + 11.

In arithmetical progreſſion there are five things to be obſerved,

1. The leaſt term. } Extremes.
2. The greateſt term. }
3. The number of terms.
4. The common difference.
5. The ſum of all the terms.

PROPOSITION I.

When the extremes and the number of terms are given, to find the ſum of all the terms.

RULE.—Multiply the ſum of the extremes by the number of terms, and half the product will be the anſwer.

1. If the greateſt term be 12, the leaſt 2, and the number of terms 6; required the ſum of the ſeries? *anſ.* 42.

2. A perſon bought 20 yards of cloth, and agreed to pay 6*d.* for the firſt yard, and 19*s.* 6*d.* for the laſt; how much did the cloth coſt him? *anſ.* 10*l.*

3. How many ſtrokes does a clock ſtrike in 10 hours? *anſ.* 55 *ſtrokes.*

4. If 50 eggs were placed in a ſtraight line, at 2 yards diſtance from each other, and the firſt a yard from a baſket, how much ground does a perſon go over, who brings them one by one into the baſket?

anſ. 5000 *yards*, or 2 *miles* and 1480 *yards*.

PROPOSITION 2.

When the extremes and the number of terms are given to find the common difference.

RULE.—Divide the difference of the extremes, by one leſs than the number of terms, and the quotient will be the anſwer.

1. If the extremes be 2 and 12 and the number of terms 6; required the common difference? *anſ.* 2.

2. If the extremes be 6 and 234, and the number of terms 20; required the common difference? *anſ.* 12.

3. A man has 10 children, the youngeſt is 5 years old, and the eldeſt 27½, they increaſe in arithmetical progreſſion; what is the common difference of their ages? *anſ.* 2½.

PROPOSITION 3.

When the extremes and the common difference are given, to find the number of terms.

RULE.—Divide the difference of the extremes, by the common exceſs, and add one to the quotient for the anſwer.

1. If the extremes be 2 and 12, and the common difference 2; what is the number of terms? *anſ.* 6.

2. A perſon being aſked how many children he had, replied the youngeſt was 5 years old, the eldeſt 27½, and the common difference of their ages was 2½ years; how many had he? *anſ.* 10.

3. A man going a journey, travelled the firſt day 5 miles, and increaſed his journey every day 3 miles, till his laſt day's travel was 38; how many days did he travel? *anſ.* 12.

PROPOSITION 4.

When the leaſt extreme, the number of terms, and the common difference are given, to find the greateſt extreme.

RULE.—Multiply the common difference by one leſs than the number of terms, add this product to the leaſt extreme, and the ſum will be the term required.

1. Given the leaſt extreme 2, the number of terms 6, and the common difference 2; required the greateſt extreme? *anſ.* 12.

2. A man going a journey of 12 days, travelled the firſt day 5 miles, and increaſed his journey every day three miles: how many miles did he travel the laſt day? *anſ.* 38.

3. A man clears a debt at 10 payments, in arithmetical progreſſion, the firſt payment was 12*l.* and the common difference 5*l.* what was the laſt payment? *anſ.* 57*l.*

PROPOSITION 5.

When the greateſt extreme, the number of terms, and the common difference are given, to find the leaſt extreme.

RULE.—Multiply the common difference by one leſs than the number of terms: ſubtract this product from the greateſt extreme, and the remainder will be the leaſt extreme.

1. Given the greateſt extreme 12, the number of terms 6, and the common difference 2; required the leaſt extreme? *anſ.* 2.

2. A man going a journey of 12 days, increaſed every day's journey 3 miles, till his laſt day's journey was 38 miles; how many miles did he travel the firſt day; *anſ.* 5 *miles.*

3. A perſon clears a debt of 345*l.* at 10 payments, increaſing 5*l.* in arithmetical progreſſion, till the laſt payment amounted to 57*l.* how much was the firſt payment? *anſ.* 12*l.*

GEOMETRICAL PROGRESSION.

A Geometrical Progreſſion, or ſeries, is a rank of numbers which continually increaſe or decreaſe, by the multiplication or diviſion of equal numbers, called the ratios; thus,

2, 4, 8, 16, 32, 64, here the multiplier or ratio is 2.
64, 32, 16, 8, 4, 2. the diviſor or ratio is 2.
3, 9, 27, 81, 243, } the ratio is 3.
243, 81, 27, 9, 3. }

In a geometrical ſeries, the product of the extremes is equal to the product of any two means equally diſtant from the ex-

tremes; thus, $2\times64=4\times32=8\times16=128$. When the number of terms is odd, the ſquare of the middle term is equal to the product of the extremes, or any two terms equally diſtant from the middle term.

If over a ſeries of terms in geometrical progreſſion, when the firſt term is equal to the ratio, be put an arithmetical ſeries, whoſe firſt term and common difference are each one; then the addition or ſubtraction of the terms or indices of the arithmetical ſeries, correſpond exactly with the multiplication or diviſion of their reſpective terms in the Geometrical ſeries; thus,

1, 2, 3, 4, 5, 6, 7, Indices.
3, 9, 27, 81, 243, 729, 2187,

Here $3+4=7$th arithmetical ſeries.

So $27\times81=2187=7$th term Geometrical ſeries.

Here $7-3=4$th term.

So $2187\div27=81=4$th term.

If the geometrical ſeries begin with one, the firſt term of the the arithmetical ſeries muſt be a cipher.

0, 1, 2, 3, 4, 5, 6, Indices.
1, 2, 4, 8, 16, 32, 64,

When the terms of the arithmetical ſeries begin with a cipher, the ſum of the indices made choice of muſt be one leſs than the number of terms given in the queſtion; for 1 ſtands over the ſecond term of the geometric ſeries, 2 over the third, &c.

Here $2+4=6$th term, arithmetical ſeries.

So $4\times16=64=7$th term, geometrical ſeries.

If the firſt term of the geometrical ſeries be greater than 1, and different from the ratio, then the firſt term of the Arithmetical ſeries muſt be a cipher; but, in this caſe the product of any two terms in the geometrical ſeries, muſt be divided by the firſt term, to make it anſwer to the ſum of the correſponding terms in the arithmetical ſeries; thus,

0, 1, 2, 3, 4, 5, 6,
5, 15, 45, 135, 405, 1215, 3645,

Here $2+4=6$th term arithmetical ſeries.

So $45\times405=18225\div5=3645=7$th term geometrical ſeries.

In geometrical progreſſion, there are alſo the following five particular things to be obſerved.

1. The leaſt term.
2. The greateſt term. } Extremes.

3. The common ratio.
4. The number of terms.
5. The ſum of all the terms.

PROPOSITION 1.

When the extremes and the number of terms are given, to find the ratio.

RULE.—Divide the greater extreme by the leſs, and extract ſuch a root of the quotient, whoſe index is one leſs than the number of terms.

1. Given the extremes 3 and 2187, and the number of terms 7; required the ratio? *anſ.* 3.
2. Given the extremes 5 and 3645, and the number of terms 7; required the ratio? *anſ.* 3.
3. Suppoſe a perſon buy 10 acres of land, and agree to pay 3*d.* for the firſt acre, increaſing the payments in geometrical proportion till the laſt acre's price amount to 246*l.* 0*s.* 9*d.* required the ratio? *anſ.* 3*d.*

PROPOSITION 2.

When the extremes and the ratio are given, to find the ſum of all the terms.

RULE.—Divide the difference of the extremes by one leſs than the ratio, and to that quotient add the greater extreme for the anſwer.

1. Given the extremes 3 and 2187, and the ratio 3; required the ſum of the terms? *anſ.* 3279.
2. Given the extremes 5 and 3645, and the ratio 3; required the ſum of the ſeries? *anſ.* 5465.
3. A gentleman, who had a daughter married on new-year's day, gave the huſband towards her portion, one guinea, promiſing to double that ſum the firſt day of every month, during the firſt year, of 12 months; he got 2948 guineas, on the firſt day of the laſt month; required the young lady's portion?

anſ. 4299*l.* 15*s.*

PROPOSITION 3.

When the leſs extreme, the ratio, and the number of terms are given, to find the greater extreme.

RULE.—Find ſome of the terms, by means of the ratio, and over them place a ſeries in arithmetical progreſſion; when the firſt term is equal to the ratio, add ſuch numbers of the indices together as will give the term required; then multiply into each other the numbers of the geometric ſeries, which anſwer ſuch indices, and the laſt product will be the term ſought. But when the firſt term is different from the ratio, add ſuch indices together as will make one leſs than the term required, and, as before, multiply into each other the numbers of the geometric ſeries which anſwer to ſuch indices, and conſider the laſt product a dividend; then raiſe the firſt term to ſuch a power, whoſe indice is one leſs than the terms multiplied for a diviſor, and the quotient will be the anſwer.

1. Required the 12th term of a geometrical ſeries, whoſe firſt term is 3, and the ratio 2? *anſ.* 6144.

2. Given the firſt term 3, and the ratio 3, required the 20th term? *anſ.* 3486784401.

3. Required the 16th term of a geometric ſeries, whoſe firſt term is 1, and the ſecond 2? *anſ.* 32768.

4. A gentleman going to a fair to buy ſome good horſes, ſaw a horſe-dealer who had 20 very fine ones, for which he aſked 20 guineas a-piece; the gentleman thinking they were over dear, the horſe dealer told him, if he would give him but a ſingle farthing for the firſt, and double that price to the 19th, he would give him the 20th into the bargain: this being immediately accepted; required how much they were ſold for, and whether the gentleman paid more or leſs than 20 guineas a head.

anſ. They were ſold for 27*l.* 6*s.* 1*d.* $2\frac{7}{20}$*qrs.* a head.

5. A ſervant agreed with a maſter to ſerve him 11 years without any other reward for his ſervice but the produce of a wheat corn for the firſt year: and that product to be ſowed the ſecond, and ſo on from year to year, until the end of the time, allowing the increaſe to be in a tenfold proportion: required the ſum of the whole produce?

Note. 7680 wheat-corns will fill a pint; and ſuppoſe the wheat ſold for 3*s.* 4*d.* per buſhel.

anſ. 11111111110 wheat corns—226056$\frac{1}{4}$ buſhels, 37676*l.* 0*s.* 5*d.* the reward.

6. An Indian, called Seſſa, having invented the game of cheſs, ſhewed it to his king, who being highly pleaſed with it, bid him aſk what he would have for the reward of his ingenuity,

whereupon he asked that for the first little square of the chess-board he might have one grain of wheat given him: for the second two, and so on, doubling continually according to the number of squares on the board, which were 64: the king, who intended him a noble reward, was displeased that he asked him what he thought such a trifle; but Sessa declaring he would be contented with it, it was ordered to be given him; but the king was astonished when he found that this would raise so vast a quantity, that the whole world could not produce it; required the number of grains, and what would they amount to, at 3*s.* 5¼*d.* per bushel?

ans. 18446744073709551615 grains, at 3*s.* 5¼*d.* per bushel, comes to 6450468216285*l.* 17*s.* 3½*d.*

A promiscuous Collection of Questions designed as an Exercise on all the foregoing Rules.

1. Light runs through the space of 1000 diameters of the earth in one minute, how many yards is that; supposing the diameter of the earth to be 8000 miles? *ans.* 1408000000*yds.*

2. How many yards of cloth, that is 8*qrs.* broad, will line a piece of tapestry that is 24 feet long, and 8 feet broad?

ans. 10⅔ *yds.*

3. If ¼ of a ship be worth 775*l.* 10*s.* what is $\frac{1}{7\frac{1}{3}}$ of her worth? *ans.* 193*l.* 17*s.* 6*d.*

4. A certain person bequeathed to his eldest son ⅔ of ⅔ of his estate, to his second son ⅓ of ⅙, and to his wife and 6 younger children the rest; the eldest son received 80*l.* more than the second; required how much the eldest and second sons got, and also the portion of the widow and young children?

ans. The eldest son got 200*l.* the second 120*l.* and the widow and younger children 880*l.*

5. In 20 guineas, and the same number of half-guineas, quarter guineas, crowns, half-crowns, and shillings; how many halfpence? *ans.* 21720 *half-pence.*

6. A nobleman having a park 7 miles in circumference, designed to have a wall built round it, for which purpose he engaged 100 workmen, who built 300 yards in 7 days; how many men must be added to finish the whole in 124 days more?

ans. 126 *men.*

7. Received account from my agent at Jamaica, sales of linen to the value of 74*l.* 18*s.* 9*d.* of stockings 13*l.* 14*s.* 8*d.* of hardware 126*l.* 19*s.* of flannel 19*l.* 7*s.* 6*d.* and of wheat to the

amount of 107*l.* 14*s.* 9*d.* He, at the ſame time, adviſes, per invoice, that he has ſhipped on my account and riſk, rum, to the value of 174*l.* 16*s.* 4*d.* ſugar 67*l.* 4*s.* 11*d.* indigo 40*l.* 17*s.* mahogany 87*l.* 19*s.* and aloes to the amount of 16*l.* 10*s.* 9*d.* his commiſſion upon both the ſales and returns is at 2½ per cent, which of us has to draw for the difference, and how much?

anſ. The agent has to draw for 62*l.* 18*s.* 4*d.* $3\frac{1}{4}$*qrs.*

8. There are two numbers, the greater 7050, which divided by the leſs quots 94: required the difference of their ſquares, and the ſquare of the product of their ſum and difference?

anſ. 49696875 difference of their ſquares, and 24697793 84765625 ſquare of the product of their ſum and difference.

9. In 15420 annues of Paris; 85 of which make 100 yards; how many ells Flemiſh? *anſ.* $24188\frac{4}{17}$.

10. How many farthings are there in 2222 pieces, each 3*s.* $10\frac{1}{2}$*d.* *anſ.* 413292 *farthings.*

11. Bought 4 parcels of hops, the firſt weighed 10*cwt.* 3*qr.* 27*lib.* the ſecond 13*cwt.* 0*qr.* 1*lib.* the third 23*cwt.* 2*qr.* and the fourth 19*cwt.* 3*qr.* 14*lib.* what will they coſt at 2*l.* 10*s.* per *cwt.* *anſ.* 168*l.* 8*s.* 9*d.*

12. Suppoſe A has ½ of a ſhip, and ſells to B ¼ of his ſhare, and B ſells half of his ſhare to C; required C's ſhare, and what part A and B had left?

anſ. C's ſhare is $\frac{1}{16}$, and A had $\frac{1}{2}$, and B $\frac{7}{16}$ left.

13. Three merchants, D, E, and F, trading in company, gain 2640*l.* which they agree to divide in the following manner, E is to receive 4*l.* as often as D receives 6*l.* and F 2*l.* as often as E 4*l.* required each perſon's ſhare of the gain?

anſ. D 1320*l.* E 880*l.* and F 440*l.*

14. Bought 3 pieces of Holland; the firſt meaſured 84 ells Flemiſh, at $15\frac{1}{4}$ ſtivers per ell; the ſecond 104 ells, at $19\frac{1}{4}$ ſtivers the ell; and the third 129 ells, at $20\frac{1}{2}$ ſtivers the ell; now ſuppoſing $10\frac{1}{2}$ ſtivers make 1*s.* ſterling; how muſt I ſell it per yard to gain 20*l.* per cent. *anſ.* 2*s.* 10*d.* $1\frac{7}{10}\frac{1}{9}\frac{3}{7}$*qr.*

15. Suppoſe 264 men, in $5\frac{1}{4}$ days of $10\frac{1}{2}$ hours long, can build a wall $234\frac{2}{7}$ yards long, $3\frac{1}{4}$ broad, and $5\frac{1}{4}$ deep; in how many days, of $9\frac{3}{4}$ hours long, will 25 men build another wall $337\frac{1}{2}$ yards long, $4\frac{1}{2}$ broad, and $7\frac{1}{2}$ high? *anſ.* $141\frac{3}{4}$ *days.*

16. A general, who had fought a battle, finds upon reviewing his army, whoſe foot was 3 times the number of his horſe, that before the engagement 120 leſs than $\frac{1}{11}$ of his foot had de-

ſerted, and of his horſe 120 more than $\frac{1}{20}$; beſides $\frac{1}{4}$ of his whole army was ſent into garriſon, including the ſick and wounded, $\frac{1}{8}$ of his army remained, the reſt who were wanting being ſlain; now if you add 3000 to the number of the ſlain, the ſum will be equal to half the foot he had at the beginning: what number of horſe and foot had he at firſt?

anſ. 30000 foot, and 10000 horſe.

17. Bought 126 gallons of honey for 6*l.* the duty upon which is 15 per cent, and a drawback of 5*l.* per cent, on the duty for prompt payment: what will the ready money duty of 2016 gallons come to? *anſ.* 13*l.* 13*s.* $7\frac{1}{7}$*d.*

18. For how much muſt I ſell cloth per yard, and give 3 months credit, to gain 25*l.* per cent per annum; when it coſt me 1*s.* 4*d.* per yard? *anſ.* 1*s.* 5*d.* *per yard.*

19. The difference of two numbers is 132, and the leſs number is 284: required the ſquare of their product, and the cube of their ſum? *anſ.* Square of their product is 1395800473600: and the cube of their ſum is 343000000.

20. In 288 firkins of beer, London meaſure, how many *hhds.*? *anſ.* 48 *hhds.*

21. A and B barter, A has 42*cwt.* 2*qrs.* of ſugar, at 3*l.* 15*s.* per *cwt.* and 12 yards of cloth, at 9*s.* 1*d.* per yard; B has $333\frac{1}{3}$ yards of Holland, at 8*s.* 3*d.* per yard; required who muſt pay the balance, and how much? *anſ.* B muſt pay 27*l.* 6*s.* 6*d.* *balance.*

22. Two men depart from the ſame place; the one goes directly north, 14 miles a day, and the other ſouth, 22 miles a day; how far are they aſunder on the 24th day? *anſ.* 864 *miles.*

23. A gentleman has an orchard of fruit trees, $\frac{1}{2}$ of which bears apples, $\frac{1}{4}$ pears, $\frac{1}{6}$ plums, and 50 of them cherries; how many trees are there in the orchard? *anſ.* 600 *trees.*

24. A linen-draper bought a certain quantity of Iriſh and Scotch linen for 29*l.* 15*s.* 6*d.* the quantity of Iriſh linen was 48 yards, at 4*s.* 4*d.* per yard; and for every 2 yards of Iriſh he had 5 of Scotch; how many yards of Scotch linen had he, and what did it coſt him per yard? *anſ.* 120 *yds.* at 3*s.* $2\frac{1}{2}$*d.*

25. A gentleman dying, left his eldeſt ſon 5280*l.* and his youngeſt $\frac{5}{11}$ of that ſum; $\frac{1}{4}$ the father's property was equal $1\frac{7}{24}$ times what he had left his eldeſt ſon: required how much the gentleman died poſſeſſed of? *anſ.* 11000*l.*

26. A ſhip being overtaken by a ſtorm, the ſeamen, in order to lighten her, threw overboard 17 hogſheads of ſugar, worth 34*l.* per *hhd.* the value of which was $\frac{1}{7}$ of the indigo they threw

out; they were also obliged to throw 13 cannons each worth 18*l.* 10*s.* overboard; the value of all that was cast into the sea amounted to $\frac{1}{7}$ of $\frac{2}{7}$ of the ship and cargo; with the rest they got safely to land; required the value of the ship and cargo before the storm, and how much of this they brought into port?

ans. The value of the ship and cargo was 6167*l.* 15*s.* $6\frac{3}{4}$*d.* and they brought 4337*l.* 15*s.* $6\frac{3}{4}$*d.* into port.

27. What number is that whose square is equal to its double, treble, and quadruple added to itself? *ans.* 10.

28. Shipped for Holland 2600 pieces of linen, each piece containing 94 yards, at 3*s.* $10\frac{1}{2}$*d.* per yard; to have returns from thence, the $\frac{1}{5}$ in gin, at 65*l.* per tun, and the other in tea, at 3*l.* 10*s.* per canniſter; what quantity of each will he receive?

ans. 364 *tuns*, 1 *hhd.* of gin, and $6764\frac{2}{5}$ canniſters of tea.

29. A merchant would change 1560*l.* for rixdollars, at 7*s.* 6*d.* a piece, crowns at 4*s.* 4*d.* and ducats at 6*s.* to be in such proportion that $\frac{1}{5}$ the number of rixdollars may be equal to $\frac{1}{7}$ the number of crowns, and $\frac{1}{4}$ of the crowns equal to $\frac{3}{16}$ of the number of ducats; required how many pieces of each he will receive?

ans. 1200 *rixd.* 1800 *crs.* and 2400 *duc.*

30. One being asked the hour of the day, replied, that the time past noon was equal to $\frac{1}{7}$ of the time till midnight; required the hour. *ans.* 2 o'clock afternoon.

31. A and B barter; A has 178 yards of cloth, at 2*s.* 6*d.* per yard, and $15\frac{1}{4}$ *cwt.* coarse sugar, at 1*l.* 3*s.* 6*d.* per *cwt.* for which B gives him 25*l.* 5*s.* in cash; and agrees to lodge him for the rest, at 20*l.* per annum; how many days' lodging must he have? *ans.* 283 days nearly.

32. A youth who had lately left school, was asked how many barley-corns would reach round the world, and how much the barley, at 3*s.* 9*d.* per bushel, would be worth, supposing 7680 barley-corns to fill a pint; which he answered rightly, and was pronounced a great scholar: try if you can do so?

ans. 475580160 barley-corns, and worth 1814*l.* 3*s.* $10\frac{1}{2}$*d.*

33. Suppose I take 300*l.* on interest for 18 months, at 6*l.* per cent, per annum, with condition to pay as much of the principal before that time as I may find convenient: now after three months I pay 60*l.* of the principal, and 4 months after 100*l.* and 5 months after 75*l.* more: how much remains to pay for the principal and interest, at the end of the 18 months?

ans. 79*l.* 15*s.*

34. A has 1600*lib.* of pepper, at 1*s.* 5*d.* per *lib.* which he

barters with B for two ſorts of goods, the one at 5*d.* the other at 8*d.* per *lib.* ſo have $\frac{1}{3}$ in money, and of each ſort of goods an equal quantity; required how many *lib.* of each ſort of goods he muſt have, and alſo how much money?

anſ. 1394$\frac{4}{11}$*lib.* of each ſort, and 37*l.* 15*s.* 6$\frac{3}{11}$*d.* in money.

35. Suppoſe I buy ſugar for 3*l.* 15*s.* per *cwt.* and ſell it for 4*l.* 6*s.* 3*d.* per *cwt.* payable in 18 months; how much do I gain per cent. per annum? *anſ.* 10*l.*

36. A merchant in London exports goods to America, amounting to 578*l.* 19*s.* 6*d.* which are ſold for 926*l.* 8$\frac{1}{10}$*s.* currency; the factor deducts 5*l.* per cent. for commiſſion and charges, and remits the remainder at 130*l.* per cent. how much is gained by the adventure? *anſ.* 98*l.* 0*s.* 3*d.*

37. If the exchange between Holland and Hamburgh be 67*d.* flemiſh per dollar, and between Holland and Germany at 70*d.* flemiſh per florin; required the par of exchange between Holland and Germany? *anſ.* 73$\frac{9}{11}$*d.* per florin.

38. The number of ſcholars in a certain ſchool is as follows, $\frac{1}{10}$ learn fluxions, $\frac{1}{10}$ learn algebra, $\frac{3}{10}$ learn geometry, $\frac{1}{8}$ arithmetic, and 9 learn ſurveying; required the number of each?

anſ. 5 learn fluxions, 12 algebra, 24 geometry, 30 arithmetic, and 9 ſurveying; total 80 ſcholars.

39. Lent, on Chriſtmas 1780, the ſum of 5000*l.* at 4$\frac{1}{2}$ per cent. after which I lent ſeveral ſums at the ſame rate, and drew upon the borrower as occaſion required, *viz.* on March 25th, 1781, I drew for 194*l.* 5*s.* on June 25th, I lent 675*l.* and drew for 700*l.* on September 25th following, I lent 569*l.* 17*s.* required how much remains due to me?

anſ. 5516*l.* 11*s.* 6$\frac{3}{4}$*d.*

40. Three perſons, D, E, and F, buy a ſhip, of which D paid $\frac{1}{3}$ of $\frac{3}{8}$, E paid $\frac{2}{3}$ of $\frac{11}{16}$, and F 140*l.* how much did D and E pay, and what part of the ſhip had F?

anſ. D paid 305*l.* 9*s.* 1$\frac{1}{11}$*d.* E 267*l.* 5*s.* 5*d.* 1$\frac{9}{11}$*qr.* and F had $\frac{11}{176}$ of the ſhip.

41. Suppoſe L gains 26*l.* in 6 months; M 36*l.* in 5 months, and N 46*l.* in 9 months with a ſtock of 155*l.* what was the general ſtock? *anſ.* 504*l.* 15*s.* 2$\frac{14}{23}$*d.*

42. Bought a quantity of goods for 480*l.* 12*s.* upon examining them, $\frac{2}{7}$ of the whole was damaged: ſo that I could only ſell the damaged part for 5*s.* 6*d.* per yard: and by ſo doing loſt 48*l.* 18*s.* at what rate per ell Engliſh muſt I ſell the undamaged part to make up my loſs? *anſ.* 12*s.* 2*d.* 1$\frac{506}{1760}$*qr.*

43. There is a crown weighing 60*lib.* which is made of gold, ſilver, copper, and braſs; the weight of the gold and ſilver together is 40*lib.* of the gold and copper 45*lib.* and of the gold and braſs 36*lib.* required how much gold was in it? *anſ.* 30½*lib.*

44. There is an Iſland 73 miles round, and 3 footmen all ſtart together, to travel the ſame way about it? A travels 5 miles a day, B 8, and C 10; when will they come together again?

anſ. 73 *days.*

45. G and H barter: G has ſugar worth 8*d.* per *lib.* but in barter rates it at 13*d.* and gives 9 months credit, H has tobacco worth 10*d.* per *lib.* but in barter inſiſts on 17*d.* required how much credit H muſt give to make the barter equal?

anſ. 6 *months.*

46. Two merchants, C and D, buy a ſhip worth 1800*l.* they have unequal ſums of money, for C ſays to D, lend me $\frac{3}{7}$ of your money, and I will be able to pay for the ſhip: and ſays D to C, lend me ¼ of your money, and then I can pay the value of the ſhip: how much had each perſon?

anſ. C 1200*l.* and D 900*l.*

47. Divide 222*l.* 16*s.* 1¼*d.* among 3 men, 9 women, and 17 boys, and give each man as much as 3 women, and each woman as much as 5 boys?

anſ. The men muſt receive 93*l.* 14*s.* 0¾*d.* the women 93*l.* 14*s.* 0¾*d.* and the boys 35*l.* 7*s.* 11½*d.*

48. A merchant in London ſent over to his correſpondent at Amſterdam 1000 moidores, the charges for ſhipping and commiſſion came to 5*l.* 19*s.* 6*d.* when they came to the place conſigned and were weighed, they amounted to 14209*gu.* 14*ſt.* currency; I demand the value in ſterling money, and how much the merchant gained or loſt by his moidores, the agio being at 5 per cent, and the courſe of exchange 34*s.* 6*d.* flemiſh per *l.* ſterling? *anſ.* 9*l.* 6*s.* 3¼*d. loſt.*

49. A gentleman left a handſome portion to his two daughters, the elder had ⅞ of ⅞ of his fortune, and the younger had 5000⅞*l.* which was juſt ⅞ of the elder's portion: required how much the father died worth? *anſ.* 17144*l.*

50. A merchant bought 14000 feet of mahogany, Spaniſh meaſure, for 600 dollars, each 58¼*d.* and paid 160*l.* for freight, commiſſion, and other charges; what did it coſt him per foot Engliſh, one Spaniſh foot being to one Engliſh, as 1·004 to 1?

anſ. 5·218*d.*

51. Hiero, king of Sicily, ordered his jeweller to make him

a crown, containing 63 ounces of gold; the workman thought ſubſtituting part ſilver therein a proper perquiſite, which coming to the king's ears, he ordered the famous Archimedes to examine it, who putting it into a veſſel of water, found it contained 8·2245 cubic inches, and having found that a cubic inch of gold weighed 10·36 ounces, and of ſilver 5·85 ounces: he found what part of his majeſty's gold had been changed, and you are deſired to repeat the proceſs.

anſ. There was 34*oz.* 3*dwts.* 22$\frac{1}{4}$*grs.* of gold, and 28*oz.* 16*dwts.* 1$\frac{3}{4}$*gr.* of ſilver in the crown.

52. A, in order to put off 720 ells of holland, at 6*s.* 8*d.* per ell, which is only worth 4*s.* propoſes, in caſe he has half the value in money, to give B a diſcount of 10*l.* per cent, and to take the reſt in ſaffron; B, appriſed of A's intention, rates in juſtice his ſaffron at 30*s.* per pound: required what it was really worth, and what quantity of it muſt be given to A?

anſ. The ſaffron was worth 20*s.* per *lib.* and A muſt receive 72*lib.* of it.

53. A merchant having ſold tobacco at 15*d.* per *lib.* loſt 10 per cent, reſolving to make up his loſs and ſomething over, he ſold 100*l.* worth of another parcel, and gained thereby 40*l.* per cent, required how many *lib.* weight there were in the laſt parcel, and what he ſold it for per *lib.*

anſ. 1028$\frac{4}{7}$*lib.* at 23$\frac{1}{7}$*d.* per *lib.*

54. Bought hoſe at London for 3*s.* 10*d* per pair, and ſold them afterwards at Dublin at 5*s.* 6*d.* per pair; now taking the charges at an average to be 1$\frac{1}{2}$*d.* per pair; and conſidering I muſt loſe 8$\frac{1}{3}$ per cent, by remitting my money home again; what will I gain per cent. *anſ.* 35*l.* 14$\frac{2}{7}$*s.*

55. Bought tapeſtry for 1*s.* 7*d.* per ell Engliſh; how muſt I ſell it per yard, to gain 15*l.* per cent. *anſ.* 1*s.* 5*d.* 1$\frac{3}{17}$*qr.*

56. An Engliſh merchant bought ſtockings at 4*s.* 3*d.* per pair; which he ſent to Ireland and ſold for 6*s.* per pair; in drawing his money home he loſt 12 per cent, and the charges attending the ſtockings were 2*d.* per pair; required how much he gained or loſt per cent? *anſ.* 31*l.* 10*s.* 11$\frac{5}{13}$*d. gain.*

57. A draper bought 28 pieces of ſtuff, at 4*l.* per piece, and ſold 10 of them at 4*l.* 6*s.* per piece, and 8 of them at 4*l.* 8*s.* per piece; at what rate muſt he ſell the reſt to gain 10*l.* per cent on the whole? *anſ.* 4*l.* 10*s.*

58. A privateer takes a prize worth 20000*l.* the crew conſiſted of the captain, the lieutenant, the maſter, maſter's mate,

ſurgeon, ſurgeon's mate, purſer, 4 midſhipmen, and 100 ſailors; by the ſhip's regulations, the ſailors ſhared equally, a midſhipman had as much again as a ſailor, each mate the double of a midſhipman's ſhare, the ſurgeon and purſer each the double of a mate's ſhare, the lieutenant and maſter had each as much as both the ſurgeon and purſer, and the captain as much as both lieutenant and maſter: required each man's ſhare?

		l.	*s.*	*d.*	*qrs.*
anſ.	Captain's ſhare	3265	6	1	$1\frac{43}{49}$
	Lieutenant's and maſter's	3265	6	1	$1\frac{43}{49}$
	Surgeon's and purſer's	1632	13	0	$2\frac{46}{49}$
	2 Mates' —	816	6	6	$1\frac{23}{49}$
	4 Midſhipmen's —	816	6	6	$1\frac{23}{49}$
	100 Sailors' —	10204	1	7	$2\frac{18}{49}$
	£.	20000	0	0	0

59. Two merchants, A and B, had traded long together; A's ſhare of the concern, upon the whole, was four times as much as B's; being at laſt determined to ſeparate, they find the ſtate of their affairs to be as follows. Their caſh and other effects, by an inventory, amounted to 5000*l.* bills and open accounts in Britain to 1300*l.* Holland was indebted to them 7485 guilders, at $21\frac{1}{2}d.$ and France 7456 crowns, at $31\frac{1}{4}d.$ they were indebted in Britain 3754*l.* and in Hamburgh 7315 marks, at 1*s.* 7*d.* required their neat ſtock, and each perſon's ſhare, according to their original ſtock?

anſ. Neat ſtock 3596*l.* 11*s.* $3d.$ $2\frac{1}{2}qrs.$ A's ſhare 2877*l.* 5*s.* $\frac{1}{2}d.$ B's ſhare 719*l.* 6*s.* $3\frac{1}{2}d.$

60. Three merchants, D, E and F, fit out a ſhip for the Weſt-Indies, for which they pay 315*l.* each; D puts into the common ſtock, for the purchaſe of ready-money goods, 274*l.* E 389*l.* and F 437*l.* They alſo buy goods at 12 months, upon their joint credit, to the amount of 2750*l.* D goes ſupercargo, and is allowed $2\frac{1}{2}$ per cent for his trouble. He arrives with a bill of exchange for 1000*l.* together with a quantity of ſugar, which they ſell for 4785*l.* His bill of charges and commiſſion amount to 360*l.* required each perſon's ſhare of the returns, after all the neceſſary deductions are made, according to his ſtock? *anſ.* D 761*l.* 1*s.* 9*d.* E 923*l.* 2*s.* $8\frac{1}{2}d.$ and F 990*l.* 15*s.* $5\frac{1}{2}d.$

61. In what time could A, B and C, jointly do a piece of

work; when A can do it in 3 weeks, B three times as much in 8 weeks, and C 5 times as much in 12 weeks?

anſ. 5 *days*, 4 *hours.*

62. X, Y, and Z can, working together, complete a ſtaircaſe in 12 days; Z is man enough to do it alone in 24 days; and X in 34 days; in what time could Y do it by himſelf?

anſ. 81$\frac{3}{7}$ *days.*

63. A, in a ſcuffle, ſeized on $\frac{2}{7}$ of a parcel of ſugar plumbs, B catched $\frac{1}{4}$ out of his hands, and C laid hold on $\frac{3}{10}$ more, D ran off with all A had left except $\frac{1}{7}$, which E afterwards ſlily ſecured for himſelf. Then A and C jointly ſet upon B, who, in the conflict, ſtrewed $\frac{1}{2}$ he had, which were equally picked up by D and E. B then kicked down C's hat, and to work they all went for what it contained; of which A got $\frac{1}{2}$, B $\frac{1}{7}$, D $\frac{2}{7}$, and C and E equal ſhares of what was left of that ſtock. D ſtruck $\frac{1}{4}$ of what A and B laſt acquired out of their hands, they with difficulty recovered $\frac{5}{10}$ of it in equal ſhares, and the other three carried off $\frac{1}{8}$ a piece of the ſame. Upon this they called a truce, and agreed, that the $\frac{1}{7}$ of the whole left by A at firſt ſhould be equally divided among them; how much of the prize after this diſtribution, remained with each of the competitors?

anſ. A 2863, B 6335, C 2438, D 10294, and E 4950.

64. A and B made the following bet for 1000 guineas, to be decided in ſix days, between the hours of eight in the morning and eight at night. The propoſer has ten choice cricketers in full exerciſe, who on this occaſion are to be diſtinguiſhed by the ten firſt letters of the alphabet. Theſe are to run and gather up, and carry ſingly, 1000 eggs, laid in a right line, two yards aſunder, putting them into a baſket placed a fathom behind the firſt. They are to run one at a time, in the following order: A is to bring the firſt 10 eggs, B the ſecond, C the third, and ſo on to K; whoſe turn it is to bring the 100th egg. After which, A ſets out for the next 10, then B, and ſo on alternately, till K ſhall have brought the 1000th egg; each perſon having fetched 100 eggs. The fellows are to have 300*l.* for their ſix days work, if they do it, and it is to be diſtributed in proportion to the ground each man has gone over. Required, how many miles each perſon will run, and what part of the 300*l.* each will receive?

anſ.	*Yds.*	*M.*	*F.*	*Yds.*	£.	*s.*	*d.*
A runs	182200 =	103	4	40 and receives	27	6	— $\frac{648}{1001}$

	Yds.	M.	F.	Yds.		£.	s.	d.
B runs	186200 =	105	6	80	and receives	27	18	— $\frac{504}{1001}$
C —	190200 =	108	0	120	———	28	10	— $\frac{369}{1001}$
D —	194200 =	110	2	160	———	29	2	— $\frac{216}{1001}$
E —	198200 =	112	4	200	———	29	14	— $\frac{72}{1001}$
F —	202200 =	114	7	20	———	30	5	11 $\frac{929}{1001}$
G —	206200 =	117	1	60	———	30	17	11 $\frac{785}{1001}$
H —	210200 =	119	3	100	———	31	9	11 $\frac{641}{1001}$
I —	214200 =	121	5	140	———	32	1	11 $\frac{497}{1001}$
K —	218200 =	123	7	180	———	32	13	11 $\frac{353}{1001}$

65. Three merchants A, B and C, freight a ſhip to Liſbon with ſugar, to the value of 15778*l.* 2*s.* 6*d.* A's ſhare was 250*cwt.* 1*qr.* 22*lib.* at 2*l.* 16*s.* B paid 2*l.* 6*s.* 8*d.* per *cwt.* for his. The ſhip meeting a ſtorm, the ſeamen were forced to throw part of the cargo overboard. A's proportion of what was thrown into the ſea was $\frac{1}{100}$ part of the ſhip's cargo; his ſtock had the ſame proportion to his part thrown overboard, that the whole cargo had to the whole thrown overboard, and $3\frac{1}{4}$ times the quantity caſt overboard was $3\frac{1}{3}$ times the whole ſhares of A and B. When they came to land, A ſold his remaining part for 4*l.* 4*s.* per *cwt.* and found himſelf a loſer of 10*l.* per cent, B advanced the remaining part of his ſugar 20*l.* per cent, and C gained 4*s.* 8*d.* per *cwt.* by the quantity he ſaved; how much did each perſon loſe by the voyage; the charge of which amounted to 500 guineas?

anſ. A 83*l.* 5*s.* B 3004*l.* 15*s.* C 1574*l.* 7*s.* 6*d.*

66. There were 25 coblers, 20 taylors, 18 weavers, and 12 combers, ſpent 6*l.* 13*s.* at a meeting; to which reckoning 5 coblers paid as much as 4 taylors, 12 taylors as much as 9 weavers, and 6 weavers as much as 8 combers, how much did each company pay, and what each man?

	£.	s.	d.		s.	d.
anſ. Coblers	1	15	0	each	1	$4\frac{4}{7}$
Taylors	1	15	0	—	1	9
Weavers	2	2	0	—	2	4
Combers	1	1	0	—	1	9

67. A had 15 pipes of Malaga wine, which he parted with to B for $4\frac{1}{2}$*l.* per cent profit. B ſold them to C for 38*l* 11*s.* 6*d.* advantage; and C made them over to D for 500*l.* 16*s.* 8*d.* and thereby gained $6\frac{1}{4}$*l.* per cent. What did the wine coſt A per pipe? *anſ.* 27*l.* 11*s.* $8\frac{12144}{16089}$*d.*

68. A town is ſupplied with water brought in pipes from 3 different fountains at the diſtance of $1\frac{3}{4}$ mile, $2\frac{5}{8}$ and $2\frac{7}{8}$ miles; each foot of pipe weighs 12*lib.* at $2\frac{1}{2}d.$ per lib. expence of laying them $13d.$ per yard; ciſterns and other expences amount to $45\frac{1}{3}l.$ ſix hundred of the inhabitants agree to pay as much annually as will amount to the intereſt of the money expended at $5l.$ per cent, how much will each perſon have to pay? *anſ.* 10*s.*

69. Suppoſe the diameters of the bores of the pipes in the above queſtion to be $4\frac{1}{2}$, $5\frac{1}{4}$, & $6\frac{1}{4}$ inches; and that the firſt runs 4 gallons per minute, and the others in proportion to the ſquares of their diameters; Now it was found that the number of families in the whole town was ſuch, that each would have exactly as many gallons per day, as the firſt pipe run per minute; How many families were there? *anſ.* 6640.

Book-Keeping by Single Entry.

IN Book-keeping by Single Entry, only two books are neceſſary; day-book and ledger.

In the day-book are recorded, promiſcuouſly as they happen, what goods are ſold on truſt, and what goods or money is received.

In the ledger are inſerted the ſeveral accounts belonging to each different perſon, which lay diſperſed in the day-book, and are arranged in their proper order of *Dr* and *Cr*. The left ſide of every page being appointed for the *Dr*. and the right for the *Cr*. An alphabet is prefixed to the ledger containing the names of the perſons whoſe accounts are therein.

Directions for the Learner.

Copy into the day-book one month's accounts, and calculate them by their proper rules, which will be of great ſervice to the learner. Then begin with the firſt account of the day-book, and poſt it into the ledger, leaving a convenient ſpace below it to contain more accounts; and if it conſiſt of more than one article, write, *To ſundries*, if *Dr*. or *By ſundries*, if *Cr*. next enter the name in the alphabet under the firſt letter of the ſurname; and laſtly write the page of the ledger, where it is placed, oppoſite the account in the day-book. Do the ſame with all the firſt month's accounts; and then copy the ſecond month's into the day-book, and poſt them in the ſame manner: proceed thus till the whole be finiſhed. Obſerve to look into the alphabet before you poſt any account, to ſee if the name be there. If it is, place the account in the ſpace under the name. When any place is filled up, the balance of the account muſt be tranſferred to another page.

The DAY-BOOK.

NEWCASTLE, January 1, 1798.

		£.	s.	d.
1	*Mr William Johnson, Dr.*			
	To 29 bushels of wheat, at 6s 4d per bush.			
	— 72½ — malt, — 8 2 —			
	— 41 — barley, — 5 9 —			
	— 67 — oats, — 4 3 —			
		64	16	3
1	*Mr Robert Jenkinson, Dr.*			
	To 10 pi. of coarse cloth, qt. 1074 yds. at 6¼d.	27	19	4½
1	*Mr Joseph Wakefield, Dr.*			
	To 4½ *lib.* green tea, at 16s 9d per *lib.*			
	— 9¾ — bohea, — 8 7 —			
	— 6¾ *oz.* nutmegs, — 0 1¾ per *oz.*			
	— 10¼ — black pepper, — 0 2¼ —			
	— 19½ *lib.* soap, — 0 8¾ per *lib.*			
		8	16	2
	15			
1	*Mr Jonathan Winterton, Dr.*			
	To 5¼ *gal.* of brandy, at 14s 10d per *gal.*			
	— 14½ — red port, — 7 11 —			
	— 13 — malaga, — 6 7 —			
	— 17¾ — lisbon, — 9 6 —			
	— 7 — mountain, — 5 8 —			
		24	6	6¼
	24			
1	*Mr Harty Goodfellow, Dr.*			
	To 6 *gal.* of rum, at 10s 6d per *gal.*			
	— 10¾ — gin, — 11 9 —			
		9	9	3¾

Newcaſtle, January 26, 1798.

1 *Mr Andrew Tomlinſon, Dr.*

			s.	d.	£.	s.	d.
To 11 pair of black ſilk ſtockings,	at	12	6	p. p.			
— 9 — white ſilk ditto,	—	11	7	—			
— 19 — worſted ditto,	—	5	3	—			
— 17 — cotton ditto,	—	6	4	—			
					22	9	2

2 *John Weſterley, Eſq. Dr.*

			l.	s.	d.	£.	s.	d.
To 27 pair of red harrateen,	at	4	16	10	p. p.			
— 19 — cotton,	—	2	19	4	—			
						187	1	10

28

2 *Mr Joſhua Houſekeeper, Dr.*

	bush.	pec.		s.	d.	£.	s.	d.
To 27	3	of peaſe,	at	4	1½	per buſh.		
— 4	2½	tares,	—	2	1¼	—		
						6	4	2

February 1

2 *Mr Humphrey Armſtrong, Dr.*

		s.	d.	£.	s.	d.
To 7 thouſand quills,	at	2	9	per *hund.*		
— 21 reams of paper,	—	1	3	per *quire.*		
				35	17	6

8

2 *Mr Thomas Barrowman, Dr.*

				£.	s.	d.
To 17 ſtones of ſoap,	at	6¼	*d.* per *lib.*	6	3	11½

15

2 *Mrs Arabella Farmer, Dr.*

			s.	d.	£.	s.	d.
To 19¾ yds Flander's lace,	at	12	10	per *yd.*			
— 30 — ribbon,	—	1	1½	—			
— 4 fans,	—	5	6	each			
— 9 ſarcenet hoods,	—	8	11	—			
					19	9	5½

21

3 *The Hon. Lord George Mountain, Dr.*

				£.	s.	d.
To 17 *hhds.* of wine,	at	7*s.*	2*d.* per *gal.*	383	15	6

Newcastle, February 21, 1798.

		£.	s.	d.
3	*Lady Lustring, Dr.*			
	To 6 pair of lamb gloves, at 2s. 3½d. p. *pair.*			
	— 8 —— kid ditto, — 2 6 ——			
	— 24¼ yds of muslin, — 6 10 p. *yd.*			
		9	19	5½
	24			
3	*Miss Louisa Darlington, Dr.*			
	To 17¾ yards red silk, at 10s. 2d. per *yd.*			
	— 20 —— brocaded satin — 19 6 ——			
	— 14¼ —— paduasoy, — 6 9 ——			
	— 8 —— taffety, — 4 2 ——			
	— 20⅛ —— green silk damask 16 10 ——			
		51	18	9
	March 4			
3	*Mr Joseph Wilmot, Dr.*			
	To 8 stones of bacon, at 5½*d.* per *lib.*	2	11	4
	15			
4	*Sir Henry Greatman, Dr.*			
	To 4 table sets of china, at 2*l.* 14*s.* 9*d.* each			
	— 2½ dozen of plates, — 0 4 7 a piece			
	— 14 coffee cups, — 0 10 6 per *doz.*			
	— 7 large punch bowls, — 0 14 10 each			
		23	12	7
4	*Mr Gregory Emerson, Dr.*			
	To 28 Hutton's arithmetics, at 2s. 3½d. a piece			
	— 16 Euclid's Elements — 7 6 ——			
		9	4	2
	23			
4	*Mr George Kidman, Dr.*			
	To 32 bushels of wheat, at 6*s.* 1*d.* per bush.	9	14	8

Newcaſtle, March 30, 1798.

4 *Mr James Newcaſtle, Dr.*

			s.	d.		£.	s.	d.
To 17 dozen pen-knives,		at	7	6	per doz.			
— 29 fire ſhovels,		—	3	7	each			
— 16 doz. plain iron candleſt.			3	1½	p. doz.			
						14	1	5

April 4

5 *Mr Alexander Penrith, Dr.*

			s.	d.		£.	s.	d.
To 96¼ yards nankeen,		at	1	8	per *yd.*			
— 33½ —— blue cloth,		—	5	0	——			
— 27½ —— drab cloth,		—	5	0	——			
— 24 —— red cloth,		—	7	6	——			
						32	5	10

10

2 *Mr Thomas Barrowman, Cr.*

By caſh in full - - - - - -						6	3	11½

16

3 *Miſs Louiſa Darlington, Dr.*

To 33¼ yards of figured ſilk, at 4*s.* per yard						6	13	

April 20

2 *Mrs Arabella Farmer, Dr.*

			s.	d.		£.	s.	d.
To 120 yards ribbond,		at	7	6	per dozen			
— 36 do. camblet,		—	1	9	per yd.			
— 36 do. crape,		—	1	8	——			
— 60 do. bombazine,		—	4	0	——			
— 40 do. grey ſtuff,		—	1	9	——			
						25	8	0

25

5 *Mr William Ogle, Dr.*

			s.	d.		£.	s.	d.
To 28½ yards fine blue cloth,		at	16	0	per *yd.*			
— 15¼ do. blue grey,		—	13	8	——			
— 28½ do. raven grey,		—	13	6	——			
						52	9	2

Newcastle, April 27, 1798.

4 *Sir Henry Greatman, Dr.*

	oz.	dwt.	gr.	s.	d.		£.	s.	d.
To a silver cup, wt.	47	16	0	at 7	6	p. oz.			
— a silver punch bowl	16	17	12	-- 6	10¾	—			
— 3 doz. spoons,	30	18	0	-- 7	2	—			
— 3 candlesticks,	51	4	6	-- 7	5	—			
— 10 plates,	67	13	0	-- 6	7	—			
							76	1	4¾

29

3 *The Hon. Lord George Mountain, Cr.*

By a bill on Messrs Douglas and Co. for 250 0 0

3 *Lady Lustring, Dr.*

	s.	d.		£.	s.	d.
To 20 yards mantua, at	3	0	per yd.			
— 25 do. persian, —	1	8	—			
— 21 do. lawn, —	7	6	—			
— 22 do. cambric, —	8	0	—			
				21	15	2

May 1

5 *Mr George Trader, Dr.*

				£.	s.	d.
To 894 yards of check, at	7¼d.	per yd.				
— 183 do. of do. —	10d.	—				
— 434 do. of do. —	10½d.	—				
— 253 do. of do. —	9d.	—				
				63	2	1½

4

1 *Mr William Johnson, Cr.*

	£.	s.	d.
By cash received	64	0	0
By abatement	0	16	3
	64	16	3

5 *Mr Nicholas Cheesemonger, Dr.*

cwt.	qrs	lib.		l.	s.	d.		£.	s.	d.
To 3	2	17	Cheshire cheese, at	2	19	10	p. cwt.			
— 1	3	14	Gloucester ditto. —	1	15	6	—			
— 4	0	16	Suffolk ditto. —	0	12	7½	—			
— 6	2	20	Yorkshire ditto. —	1	13	9	—			
								28	2	8½

Newcaſtle, May 6, 1798.

6 *Mr Moſes Greenwell, Dr.*

			s.	d.		£.	s.	d.
To 31 yds. worſted white ſhag,	at	1	9	p. *yd.*				
— 30 — ditto blue,	—	1	10	—				
— 30½ — ditto ditto,	—	1	11	—				
— 31 — ditto ſcarlet,	—	2	8	—				
— 16 — ditto blue hair	—	5	9	—				
						17	2	4½

12

3 *Miſs Louiſa Darlington, Dr.*

		s.	d.				
To 24 yds of ducape,	at	7	6	per *yd.*			
— 11 do. brocade,	—	9	8	——			
— 10½ do. luſtring,	—	5	3	——			
— 4½ do. perſian,	—	1	9	——			
					17	9	4

19

1 *Mr Joſeph Wakefield, Dr.*

		s.	d.				
To 4 *lib.* green tea,	at	17	6	p. *lib.*			
— 12 do. bohea,	—	7	10¾	—			
— 9 do. pepper,	—	2	9	—			
— 8¼ do. coffee,	—	12	9	—			
— 77 *oz.* mace,	—	1	6	p. *oz.*			
					20	10	2¼

27

1 *Mr Robert Jenkinſon, Cr.*

By caſh in full - - - - -					27	19	4½

June 6

2 *Mr Joſhua Houſekeeper, Dr.*

		s.	d.				
To 6 quarters oats,	at	2	4	per *buſh.*			
— 18 buſhels peaſe,	—	3	9½	——			
— 12 —— beans,	—	4	8	——			
— 19 —— tares,	—	1	10	——			
— 7 quarters malt,	—	3	1½	——			
— 15 lib. hops,	—	1	5	per *lib.*			
					23	7	4

Newcaſtle, June 11, 1798.

6 *Mr Eraſmus Gordon, Dr.*
To 14 *cwt.* of flax, 6*s.* 9*d.* per ſtone - 37 16 0

3 *Mr Humphrey Armſtrong, Cr.*
By caſh in full - - - - - - 35 17 6

19

1 *Mr William Johnſon, Dr.*
To 6 laſts of barley, at 3*l.* 4*d.* 80 0 0

25

6 *Mr Andrew Harriſon, Dr.*

			s.	*d.*	
To 27 calf ſkins,	at	3	9	per ſkin	
— 75 ſheep ditto,	—	1	7	——	
— 36 ditto ditto,	—	1	8	——	
— 15 buck ditto,	—	11	6	——	
— 17 Ruſſia hides	—	10	7	per hide	
— 120 lamb ſkins,	—	1	2½	per ſkin	
					38 17 5

July 7

6 *Mr John Montague, Dr.*

		s.	*d.*	
To 19 gallons of gin,	at	2	5½	per quart
— 20 anchors of brandy,		11	6	per gallon
				124 6 10

12

6 *Mr Thomas Merchant, Dr.*

cwt.	*qr.*	*lib.*		*l.*	*s.*	*d.*	
To 1	2	18	of pepper, at	0	1	11½	p. *lib.*
— 0	3	14	cloves, —	0	4	9	——
—30	1	7	raiſins, —	1	19	10	p. *cwt.*
— 4	2	19	ſoap, —	2	18	8	——
							115 11 1½

14

2 *Mr Joſhua Houſekeeper, Dr*
To 27 dozen of candles, at 6½*d.* per *lib.* 8 15 6

Newcaſtle, July 14, 1798.

		£.	s.	d.
4	*Sir Henry Greatman, Cr.*			
	By 20 laſts of wheat, at 10 11½ per boll			
	— 14 — ditto, — 10 6 —			
		732	6	8
	20			
3	*The Hon. Lord George Mountain, Dr.*			
	To 6 puncheons of rum, at 10*s.* 9*d.* per gallon.	270	18	0
3	*Miſs Louiſa Darlington, Dr.*			
	To 10¾ yds, ſattin, at 9 6 per *yd.*			
	— 15 — brocade, — 10 8 —			
	— 11 ſcarfs, — 10 0 each			
	— 14 yds. Genoa velvet, — 17 4 per *yd.*			
	— 10 — luſtring — 5 2 —			
		33	6	5½
	26			
1	*Mr Harty Goodfellow, Cr.*			
	By caſh in full	9	9	3¾
6	*Mr George Candleſtick, Dr.*			
	To 6½ tuns of tallow, at 7*s.* 4*d.* per ſtone	381	6	8
	Auguſt 1			
3	*Mr Joſeph Wilmot, Dr.*			
	To 30*ſt.* 12*lib.* of bacon, at 0 5 8 per *ſtone*			
	— 13 firkins of butter, — 1 12 6 per *fir.*			
		29	17	4½
5	*Mr William Ogle, Dr.*			
	To 43¾ yds. broad cloth at 17 9 p. *yd.*			
	— 100⅞ — common yd. w. — 4 10½ —			
	— 72 — fine narrow, — 7 4 —			
	— 24 — ſuperfine Span. blue 18 6 —			
		112	0	3½

Newcaſtle, Auguſt 4, 1798.

6 *Mr Thomas Merchant, Dr.*

cwt.	qr.	lib.			l.	s.	d.		
To 10	3	18	of ſugar,	at	2	16	10	p.	cwt.
— 1	1	17½	— tea,	—	29	6	0	—	
— 15	0	17½	— raiſins	—	1	19	10	—	
— 8	0	14	— hops	—	6	14	9	—	

£.	s.	d.
157	2	8

10

4 *Sir Henry Greatman, Dr.*

To a plate of gold, wt. 10oz. 14*dwts.* 8*grs.* at 5*l.* 14*s.* 9*d.* per ounce

£.	s.	d.
61	9	8½

1 *Mr Jonathan Winterton, Cr.*

By caſh in full - - - - - -

£.	s.	d.
24	6	6½

14

4 *Mr James Newcaſtle, Dr.*

			s.	d.	
To 5	doz.	fine ſteel ſnuffers,	at 1	6¼	a piece
— 2¼	—	London razors.	-- 2	4	—
— 6¾	—	Kentiſh hammers,	-- 5	6½	a doz

£.	s.	d.
9	18	7¼

20

2 *Mr John Weſterley, Cr.*

By caſh in part - - - - - -

£.	s.	d.
100	0	0

24

2 *Mr Joſhua Houſekeeper, Dr.*

			l.	s.	d.	
To 20	blue quilts,	at	0	10	11¾	each
— 9	chintz ditto,	—	1	4	9	—
— 15	pair of fine blankets,		0	17	8½	per pair

£.	s.	d.
35	7	11½

Sept. 6

2 *Mrs Arabella Farmer, Cr.*

By caſh in full - - - - - -

£.	s.	d.
44	17	5½

Newcastle, September 6, 1798.

2 *Mr Joshua Housekeeper, Dr.*

		£.	s.	d.
To 181 bushels of oats, at 2s. 9¾d. per bush.				
— 417 — barley, - 4s. 9d. —				
		124	9	9¾

10

4 *Sir Henry Greatman, Dr.*

	s.	d.		
To 34 *hhds.* of beer,	at 1	1½	per gal.	
— 19 *gal.* of gin,	— 2	5½	per quart	
			112	12 4

12

2 *Mr John Westerly, Cr.*

By cash in full - - - - - -	87	1	10

16

5 *Mr Nicholas Cheesemonger, Dr.*

cwt. q. lib.	l.	s.	d.	
To 2 1 7 Cheshire,	at 2	8	6	p. cwt.
— 3 0 19 Gloucester,	— 1	14	8	—
— 6 1 16 Stilton,	— 1	8	9	—
— 7 0 14 Suffolk,	— 0	14	10	—
			25	11 5¾

17

3 *Miss Louisa Darlington, Dr.*

To 69¾ yds. diaper, at 1s. 6d. per yard	5	4	7½

20

1 *Mr Joseph Wakefield, Dr.*

To 60 *lib.* of tea, at 7½d. per ounce	30	0	0

Mr Joseph Wilmot, Cr.

3 By cash in full - - - - - -	32	8	7¼

27

4 *Mr James Newcastle, Dr.*

		s.	d.	
To 5 quarters oats,	at 2	3		per bush.
— 7 — bran	— 1	10		—
— 9 bushels beans,	— 4	10		—
— 19 — tares,	— 1	11		—
— 16 — peas,	— 3	11½		—
			16	15 11

		£.	s.	d.
	——Newcaſtle, October 2, 1798.——			
3	*The Hon. Lord George Mountain, Dr.*			
	oz. dt. gr. s. d.			
	To a ſil. ſet of caſtors, wt. 25 10 10 at 7 9 p. *o.*			
	—— plates, -- 85 14 15 -- 6 6 —			
	——tea pot and lamp, -- 29 16 15 -- 6 4 —			
		47	3	10½
	—3—			
5	*Mr Alexander Penrith, Dr.*			
	s. d.			
	To 18⅛ yds. ſcarlet, at 10 6 per yard			
	— 200 — ſhalloon, -- 1 2½ ——			
	— 12 doz. twiſt buttons, -- 1 6 per doz.			
		22	15	2¼
	—5—			
5	*Mr George Trader, Cr.*			
	By caſh in part - - - - -	38	10	0
3	*Lady Luſtring, Dr.*			
	s. d.			
	To 6¼ yds ducape, at 6 4 per yard			
	— 53⅛ — brocade, — 8 10 ——			
	— 71⅛ — Perſian, — 1 2½ ——			
	— 21⅛ — luſtring, — 5 3 ——			
		35	7	0
	—8—			
5	*Mr George Trader, Dr.*			
	To 19 ſtones of leather, at 10½*d.* per *lib.*	11	12	9
2	*Mr Joſhua Houſekeeper, Cr.*			
	By caſh in full - - - - -	182	12	10
	—10—			
6	*Mr Thomas Merchant, Dr.*			
	c. q. lib. *l. s. d.*			
	To 45 1 10 of ſugar, at 2 7 6 per *cwt.*	107	13	7¼
	—12—			
4	*Sir Henry Greatman, Dr.*			
	To 184⅜ gallons of mountain wine, at 4*s.* 7¼*d.* per gallon - -	42	8	10½

		£.	s.	d.
	Newcaſtle, October 16, 1798.			
1	*Mr Joſeph Wakefield, Cr.*			
	By caſh in part - - - - - -	40	0	0
1	*Mr Andrew Tomlinſon, Dr.*			
		s. d.		
	To 15 pair of cotten hoſe at 3 7 p. p.			
	— 12 — worſted — 3 10 —			
	— 18 — ſtrawberry, — 4 0 —			
	— 16 — ſilk gloves, — 5 11½ —			
	— 74 — Norwich hoſe, — 2 6 —			
	— 11 — ſilk ditto, — 16 6 —			
		31	13	7
	18			
6	*Mr John Montague, Cr.*			
	By caſh in full - - - - -	124	6	10
6	*Mr Thomas Merchant, Cr.*			
	cwt. q. l. s. d.			
	By 19 3 hops, at 5 5 10 per *cwt.*			
	— 10 1 — — 4 19 0 —			
		155	4	11½
	20			
7	*Miſs Louiſa Darlington, Dr.*			
	ell. fle. q. s. d.			
	To 17 1 of Flanders lace, at 17 5¼ p. ell	15	2	3
	24			
4	*Mr Gregory Emerſon, Cr.*			
	By caſh in full - - - - -	9	4	2
	30			
6	*Mr George Candleſtick, Cr.*			
	yds. q. na. s. d.			
	By 131 1 0 of Iriſh linen, at 4 8¼ p. *yd.*			
	— 87 0 1 — muſlin — 8 7¼ —			
		68	4	3¾
	Nov. 1			
5	*Mr William Ogle, Cr.*			
	By 37*qr.* 7*buſh.* of oats, at 14*s.* 9*d.* p. *quarter.*	27	18	7¾
3	*Lady Luſtring, Cr.*			
	By caſh in full - - - - -	67	1	7½

		£.	s.	d.
	Newcaſtle, November 1, 1798.			
7	*Miſs Louiſa Darlington, Cr.*			
	By caſh in part - - - - - -	100	0	0
	7			
7	*Mr Joſhua Houſekeeper, Dr.*			
	cwt. qr. lib. *l. s. d.*			
	To 28 2 17 coarſe ſugar, at 2 19 4¾ p. *cwt.*	85	1	9
7	*Mr Joſeph Wholeſale, Cr.*			
	By 420 yds. broad cloth, at 14*s.* 10½*d.* p. *E. E.*	250	5	0
	10			
6	*Mr Moſes Greenwell, Cr.*			
	By caſh in full - - - - - -	17	2	4½
	12			
3	*The Hon. Lord George Mountain, Dr.*			
	s. d.			
	To 112 *lib.* of coffee, at 5 4 per *lib.*			
	— 52 ſtones of ſugar, — 7 6 p. ſtone			
		49	7	4
	15			
6	*Mr Eraſmus Gordon, Cr.*			
	By 7 groſs of buckles, at 1*s.* 2½*d.* per pair	60	18	0
	18			
	Mr George Jaminſon, Dr.			
	lb. *d.*			
	To 4 frails of raiſins, wt. 448 at 3¾ p. *lb.*			
	— 6 ——— ——— — 827 -- 4½ ———			
	— 1 puncheon of prunes — 604 -- 7¼ ———			
	— 8 bags of pepper, — 1774 -- 9 ———			
		107	5	6½
	20			
1	*Mr Andrew Tomlinſon, Cr.*			
	By 181 yds of cloth, at 2*s.* 9¾*d.* per *yd.*	25	9	0¾
	24			
7	*The Hon. Lord George Mountain, Dr.*			
	s. d.			
	To 137 gallons of rum at 9 2 per gal.			
	— 157 ——— — — 7 4 ———			
		120	7	2

Newcaſtle, November 26, 1798.

		£.	s.	d.
4	*Mr James Newcaſtle, Cr.*			
	By caſh in full - - - - - -	40	15	11¾
	27			
8	*Sir Henry Greatman, Dr.*			
	To 871 *oz.* of plate, at. 5*s.* 4*d.* per ounce	232	5	4
	December 6			
5	*Mr Alexander Penrith, Cr.*			
	By caſh in full - - - - - -	55	1	0¾
	7			
8	*Mr Daniel Roberts, Dr.*			
	To 171 yds. ſhalloon, at 2 7 per yard			
	— 173 — — — 2 11 —			
	— 175 — Yorkſh. cloth, — 4 9 —			
	— 177 fine narrow, — 7 10 —			
		158	4	1
	8			
7	*Mr Joſhua Houſekeeper, Cr.*			
	By caſh in full - - - - - -	100	13	8½
8	*Mr Ambroſe Patterſon, Dr.*			
	yds. s. d.			
	To 12 pi. ribbon, meaſuring 179 at 1 6½ p. *y.*			
	— 20 — — 979 — 1 7¼ —			
	— 18 — — 917 — 1 7¾ —			
	— 16 — — 821 — 1 9½ —			
	— 10 — — 171 — 1 9¾ —			
		256	16	6¼
	12			
1	*Mr William Johnſon, Cr.*			
	By caſh in full - - - - - -	80	0	0
5	*Mr Nicholas Cheeſemonger, Cr.*			
	By caſh in part - - - - - -	40	0	0
	16			
6	*Mr Andrew Harriſon, Cr.*			
	By caſh in full - - - - - -	38	17	5
	20			
7	*Mr George Jaminſon, Cr.*			
	By caſh in part - - - - - -	80	0	0

		£.	s.	d.
	Newcaſtle, December 20, 1798.			
8	*Sir Henry Greatman, Dr.*			
	s. d.			
	To 743 yds. linen, at 3 4 per yard			
	— 873 — muſlin, — 6 8 —			
		414	16	8
	26			
7	*The Hon. Lord George Mountain, Cr.*			
	By caſh in full - - - - - -	621	11	10
	27			
8	*Mr William Hardware, Dr.*			
	s. d.			
	To 350 razors, at 1 3¾ each			
	— 420 penknives, — 0 9½ —			
	— 950 pair of ſciſſors, — 0 2½ p. p.			
	— 230 — — — 0 4¾ —			
		54	0	10
	28			
1	*Mr Joſeph Wakefield, Cr.*			
	By caſh in full - - - -	19	6	4¼
	28			
4	*Mr George Kidman, Cr.*			
	By caſh in full - - - -	9	14	8
	29			
7	*Miſs Louiſa Darlington, Cr.*			
	By caſh in full - - - -	29	14	5
7	*Mr George Jamiſon, Cr.*			
	By caſh in full - - - - - -	27	5	6½
	30			
8	*Mr Ambroſe Patterſon, Cr.*			
	By caſh in full - - - - - -	256	16	6¾

Ledger A.

THE ALPHABET.

A	B	C
Hum. Armſtrong 2	*T. Barrowman* 2	*N. Cheeſemonger* 5 *Geo. Candleſtick* 7
D	**E**	**F**
L. Darlington 3. 7	*Greg. Emerſon* 4	*Arabella Farmer* 2
G	**H**	**I**
Harry Goodfellow 1 *H. Greatman* 4. 8 *Moſes Greenwell* 6 *Eraſmus Gordon* 6	*J. Houſekeeper* 2. 7 *And. Harriſon* 6 *Wm. Hardware* 8	*Wm. Johnſon* 1 *Rob. Jinkinſon* 1 *Geo. Jaminſon* 7
K	**L**	**M**
George Kidman 4	*Lady Luſtring* 3	*G. Mountain* 3. 7 *John Montague* 6 *Thos. Merchant* 6
N	**O**	**P**
James Newcaſtle 4	*William Ogle* 5	*Alex. Penrith* 5 *A. Patterſon* 8
Q	**R**	**S**
	Daniel Roberts 8	
T	**U**	**W**
And. Tomlinſon 1 *George Trader* 5		*Joſeph Wakefield* 1 *Jonath. Winterton* 1 *John Weſterly* 2 *Joſeph Wilmot* 3 *Joſeph Wholeſale* 7
X	**Y**	**Z**

1798.	(1) Dr. Mr William	£.	s.	d.
Jan. 1	To sundries	64	16	3
June 19	To 6 lasts of barley, at 3s. 4d.	80	0	0
		144	16	3

	Dr. Mr Robert			
Jan. 1	To 10p. cloth qt. 1074yds. 6¼d.	27	19	4½

	Dr. Mr Joseph			
Jan. 1	To sundries	8	16	2
May 19	To sundries	20	10	2¼
Sept. 20	To 60lb. of tea, at 7½d. p. oz.	30	0	0
		59	6	4¼

	Dr. Mr Jonathan			
Jan. 15	To sundries	24	6	6½

	Dr. Mr Harty			
Jan. 24	To sundries	9	9	3¾

	Dr. Mr Andrew			
Jan. 26	To sundries	22	9	2
Oct. 16	To sundries	31	13	7
		54	2	9

1798.	Johnson, Cr.	£.	s.	d.
May 4	By sundries	64	16	3
Dec. 12	By cash in full	80	0	0
		144	16	3

	Jenkinson, Cr.			
May 27	By cash in full	27	19	4½

	Wakefield, Cr.			
Oct. 16	By cash in part	40	0	0
Dec. 27	By cash in full	19	6	4¼
		59	6	4¼

	Winterton, Cr.			
Aug. 10	By cash in full	24	6	6½

	Goodfellow, Cr.			
July 26	By cash in full	9	9	3¾

	Tomlinson, Cr.			
Nov. 20	By 181yds cloth, at 2s. 9¾d. p.y.	25	9	0¾
	By account at folio 1, ledger B	28	13	8¼
		54	2	9

1798.	(2) Dr. Mr John	£.	s.	d.
Jan. 26	To sundries - -	187	1	10

1798.	Westerly, Esq. Cr.	£.	s.	d.
Aug. 20	By cash in part	100	0	0
Sept. 12	By cash in full	87	1	10
		187	1	10

	Dr. Mr Joshua			
Jan. 28	To sundries -	6	4	2
June 6	To sundries -	23	7	4
July 14	To 27 doz. candles, at 6½d. p. lb.	8	15	6
Aug. 24	To sundries - -	35	7	11½
Sept. 6	To sundries - -	124	9	9¼
		198	4	9¼

	Housekeeper, Cr.			
Oct. 8	By cash in full -	182	12	10
	By account at folio 7,	15	11	11¼
		198	4	9¼

	Dr. Mr Humphrey			
Feb. 1	To sundries -	35	17	6

	Armstrong, Cr.			
June 11	By cash in full -	35	17	6

	Dr. Mr Thomas			
Feb. 8	To 17lb. of soap, at 6¼d. p. lb.	6	3	11½

	Barrowman, Cr.			
Apr. 10	By cash in full -	6	3	11½

	Dr. Mrs Arabella			
Feb. 15	To sundries - -	19	9	5½
Apr. 20	To sundries - -	25	8	0
		44	17	5½

	Farmer, Cr.			
Sept. 6	By cash in full -	44	17	5½

1798.	(3) *Dr. The Hon. Lord*	£.	s.	d.
Feb. 21	To 17 *hhds.* wine, at 7*l.* 2*d.* p. *g.*	383	15	6
July 20	To 6 pun. rum. at 10*s.* 9*d.*—	270	18	0
Oct. 2	To sundries	47	3	10
Nov. 12	To sundries	49	7	4
		751	4	8

	Dr. Lady			
Feb. 21	To sundries	9	19	5½
Apr. 29	To sundries	21	15	2
Oct. 5.	To sundries	35	7	0
		67	1	7½

	Dr. Miss Louisa			
Feb. 24	To sundries	51	18	9
Apr. 16	To 33¼ *yds.* silk, at 4*s.* per yard	6	13	0
May 12	To sundries	17	9	4
July 20	To sundries	33	6	5½
Sept. 17	To 69¾ *yds* diaper, at 1*s.* 6*d.*	5	4	7½
		114	12	2

	Dr. Mr Joseph			
Mar. 4	To 8*ft.* bacon, at 5½*d.* per *lb.*	2	11	4
Aug. 1	To sundries	29	17	3¾
		32	8	7¾

1798.	*George Mountain, Cr.*	£.	s.	d.
Apr. 29	By a bill on Messf. Douglas & co.	250	0	0
	By account at folio 7	501	4	8
		751	4	8

	Lustring, Cr.			
Nov. 1.	By cash in full	67	1	7½

	Darlington, Cr.			
	By account at folio 7	114	12	2

	Wilmot, Cr.			
Sept. 20	By cash in full	32	8	7¾

1798.	(4) *Dr.* *Sir Henry*	£.	s.	d.
Mar. 15	To sundries -	23	12	7
Apr. 27	To sundries - -	76	1	$4\frac{3}{4}$
Aug. 10	To a plate of gold -	61	19	$8\frac{1}{2}$
Sept. 10	To sundries - -	112	12	4
Oct. 12	To $184\frac{1}{16}$ *gal.* wine, at 4*s.* $7\frac{1}{4}$*d.* p. *g.*	42	8	$10\frac{1}{2}$
	To account at folio 8.	415	11	$9\frac{1}{4}$
		732	6	8

1798.	*Greatman,* *Cr.*	£.	s.	d.
July 14	By sundries - -	732	6	8

	Dr. *Mr Gregory*			
Mar. 15	To sundries - -	9	4	2

	Emerson, *Cr.*			
Oct. 24	By cash in full - -	9	4	2

	Dr. *Mr George*			
Mar. 23	To 32 *bush.* wheat, at 6*s.* 1*d.* p. *b.*	9	14	8

	Kidman, *Cr.*			
Dec. 28	By cash in full - -	9	14	8

	Dr. *Mr James*			
Mar. 30	To sundries - -	14	1	5
Aug. 14	To sundries - -	9	18	$7\frac{3}{4}$
Sept. 27	To sundries - -	16	15	11
		40	15	$11\frac{3}{4}$

	Newcastle, *Cr.*			
Nov. 26	By cash in full - -	40	15	$11\frac{3}{4}$

1798.	(5) Dr.	Mr Alexander	£.	s.	d.	1798	Penrith,	Cr.	£.	s.	d.
April 4	To sundries	- -	32	5	10	Dec. 6	By cash in full	- -	55	1	0¾
Oct. 3	To sundries	- -	22	15	2¾						
			55	1	0¾						
	Dr.	Mr William					Ogle,	Cr.			
Apr. 25	To sundries	- -	52	9	2	Nov. 1	By 37q. 7lb. oats, at 14s. 9d. p. q.		27	18	7¾
Aug. 1	To sundries	- -	112	0	3¾		By account at folio 1, ledg. B.		136	10	10
			164	9	5¾				164	9	5¾
	Dr.	Mr George					Trader,	Cr.			
May 1	To sundries	- -	63	2	1½	Oct. 5	By cash in part,	-	38	10	0
Oct. 8	To 19st. leather, at 10½d. p. lib.		11	12	9		By account at folio 1, ledg. B.		36	4	10½
			74	14	10½				74	14	10½
	Dr.	Mr Nicholas					Cheesemonger,	Cr.			
May 4	To sundries	- -	28	2	8½	Dec. 12	By cash in part - -		40	0	0
Sep. 16	To sundries	- -	25	11	5¾		By account at folio 1, ledg. B.		13	14	2¼
			53	14	2¼				53	14	2¼

1798.	(5) Dr. Mr Moſes	£.	s.	d.
May 6	To ſundries - -	17	2	4½

	Dr. Mr Eraſmus			
June 11	To 1 *cwt.* flax, at 6*s.* 9*d.* p *ſt.*	3	16	0
	To account at folio 1, ledg. B.	23	2	0
		60	18	0

	Dr. Mr Andrew			
June 25	To ſundries - -	38	17	5

	Dr. Mr John			
July 7	To ſundries - -	124	6	10

	Dr. Mr Thomas			
July 12	To ſundries - -	115	11	1½
Aug. 4	To ſundries - -	157	2	8
Oct. 10	To 45 *cwt.* 1 *q.* 10 *lb.* at 2*l.* 7*s.* 6*d.*	107	13	7¼
		380	7	4¾

	Dr. Mr George			
July 26	To 6½ tons tallow, at 7*s.* 4*d.* p. *ſt.*	381	6	8

1798.	Greenwell, Cr.	£.	s.	d.
Nov. 10	By caſh in full - -	17	2	4½

	Gordon, Cr.			
Nov. 15	By 73 *yr.* buckles, 1*s.* 2½*d.* p. p	60	18	0

	Harriſon, Cr.			
Dec. 16	By caſh in full - -	38	17	5

	Montague, Cr.			
Oct. 18	By caſh in full -	124	6	10

	Merchant, Cr.			
Oct. 18	By ſundries -	155	4	11½
	By account at folio 1, ledg. B.	225	2	5¼
		380	7	4¾

	Candleſtick, Cr.			
Oct. 30	By ſundries - -	68	4	3¾
	By account at folio 2, ledg. B.	313	2	4¼
		381	6	8

	(7) Dr. Miss Louisa	£.	s.	d.
1798.	To account at folio 4	114	12	2
Oct. 20	To 17 *e. fl.* 19. lace, 17*s.* 5¼*d.* p. *ell.*	15	2	3
		129	14	5

	Dr. Mr Joshua			
	To account at folio 2	15	11	11½
Nov. 7	To 28 *cwt.* 2*q.* 17 *lib.* of sugar at 2*l.* 19*s.* 4½*d.* per *cwt.*	85	1	9
		100	13	8½

	Dr. Mr Joseph			
	To account at folio 2, ledg. B.	250	5	0

	Dr. Mr George			
Nov. 18	To sundries - -	107	5	6½

	Dr. The Hon. Lord			
	To account at folio 4	501	4	8
Nov. 24	To sundries - -	120	7	2
		621	11	10

1798.	*Darlington.* Cr.	£.	s.	d.
Nov. 1	By cash in part - -	100	0	0
Dec. 29	By cash in full - -	29	14	5
		129	14	5

	Housekeeper, Cr.			
Dec. 8	By cash in full - -	100	13	8½

	Wholesale, Cr.			
Nov. 7	By 420 yds of broad cloth, at 14*s.* 10½*d.* per *ell Eng.*	250	5	0

	Jamieson, Cr.			
Dec. 20	By cash in part - -	80	0	0
29	By cash in full - -	27	5	6½
		107	5	6½

	George Mountain, Cr.			
Dec. 26	By cash in full - -	621	11	10

1798.	(8) *Dr.* *Sir Henry*	£.	s.	d.
Nov. 27	To 87 1oz. plate, at 5s. 4d. p. oz.	232	5	4
Dec. 20	To sundries - -	414	16	8
		647	2	0

1798.	*Greatman,* *Cr.*	£.	s.	d.
	By account at folio 5 -	415	11	9¼
	By account at folio 2, ledg. B	231	10	2¾
		647	2	0

	Dr. *Mr Daniel*			
Dec. 7	To sundries -	158	4	1

	Roberts, *Cr.*			
	By account at folio 2, ledg. B	158	4	1

	Dr. *Mr Ambrose*			
Dec. 8	To sundries -	256	16	6¾

	Patterson, *Cr.*			
Dec. 30	By cash in full -	256	16	6¾

	Dr. *Mr William*			
Dec. 27	To sundries - -	54	0	10

	Hardware, *Cr.*			
	By account at folio 2, ledg. B	54	0	10

	Dr. *Balance*			
	To Mr Tomlinson due to me	28	13	8¼
	— Mr Wm. Ogle -	136	10	10
	— Mr Geo. Trader -	36	4	10½
	— Mr N. Cheesemonger	13	14	2¼
	— Mr Tho. Merchant -	225	2	5¼
	— Mr G. Candlestick -	313	2	4¼
	— Sir H. Greatman -	231	10	2¾
	— Mr D. Roberts -	158	4	1
	— Mr Wm. Hardware -	54	0	10

	Balance, *Cr.*			
	By Mr E. Gordon due to him	23	2	0
	By Mr J. Wholesale -	250	5	0

Ledger B.

THE ALPHABET.

A	B	C
		N. Cheesemonger 1 *Geo. Candlestick* 7
D	E	F
G *Erasmus Gordon* 1 *H. Greatman* 2	H *Wm. Hardware* 2	I
K	L	M *Thos. Merchant* 1
N	O *William Ogle* 1	P
Q	R *Daniel Roberts* 2	S
T *And. Tomlinson* 1 *George Trader* 1	U	W *Joseph Wholesale* 2
X	Y	Z

(1) Dr. Mr Andrew	£.	s.	d.	Tomlinson, Cr.	£.	s.	d.
To account at folio 1, ledg. A	28	13	8¼				
Dr. Mr William				Ogle, Cr.			
To account at folio 5, ledg. A	136	10	10				
Dr. Mr George				Trader, Cr.			
To account at folio 5, ledg. A	36	4	10½				
Dr. Mr Nicholas				Cheesemonger, Cr.			
To account at folio 5, ledg. A	13	14	2¼				
Dr. Mr Erasmus				Gordon, Cr.			
				By account at folio 6, ledg. A	23	2	0
Dr. Mr Thomas				Merchant. Cr.			
To account at folio 6, ledg. A	225	2	5¼				

Q 3

(2) Dr. Mr George	£.	s.	d.	Candlestick, Cr.	£.	s.	d.
To account at folio 6, ledg. A	313	2	4¼				
Dr. Mr Joseph				Wholesale, Cr.			
				By account at folio 7, ledg. A	250	5	0
Dr. Sir Henry				Greatman, Cr.			
To account at folio 8, ledg. A	231	10	2¼				
Dr. Mr Daniel				Roberts, Cr.			
To account at folio 8, ledg. A	158	4	1				
Dr. Mr William				Hardware, Cr.			
To account at folio 8, ledg. A	54	0	10				

APPENDIX.

Containing RECEIPTS, PROMISSORY NOTES, and BILLS of EXCHANGE, with proper EXERCISES.

RECEIVED, 4th May 1797, of Mr George Johnſon, thirty pounds, ten ſhillings, in full.

£. 30 10. James Sommerville.

Received, 5th October, 1798, of Mr George Trader, fifty pounds, on account.

£. 50 William Merchant.

Received, 2d December, 1798, of James Greatman, Eſq. ſeventy-five pounds, in part of a bill of one hundred pounds.

£. 75. Roger Taylor.

Received, 17th March, 1798, of Mr Robert Walton, one hundred pounds, for ſelf and company.

£. 100. James Alderman.

Received, 14th May, 1797, of Mr George Turnbull, five pounds for half-a-year's intereſt of two hundred pounds, lent on bond to the truſtees of the Low Meeting, due the 1ſt inſtant.

£. 5 James Careful.

A PROPER RECEIPT FOR a BOX SOCIETY.

Received, 6th November, 1797, of Meſſrs James Gregory, and Iſaac Horn, preſent truſtees for the Liberal Society, ſtatedly meeting in my houſe, one hundred and ten pounds ſixteen ſhillings; lawful money of Great Britain, which I promiſe to pay and deliver, or cauſe to be paid and delivered, to them, or to their order, or to their ſucceſſors in place and truſt for the time being; and that upon demand, for the uſe and behoof of the ſaid ſociety; as witneſs my hand, day and date above written,

Atteſts Francis Truſty.

William Clerk.

Received 19th April, 1797, of Meſſrs Jameſon and Chriſtie, aſſignees of the effects of Andrew Mercer, a bankrupt, thirty pounds; being my proportion of the ſaid bankrupt's effects, and

is after the rate of ten shillings per pound, for my debt of sixty pounds, proved under the said commission.

£. 30 David Linendraper.

PROMISSORY NOTES.

Newcastle upon Tyne, 7th of May, 1797.

I promise to pay to Mr Erasmus Coaltrade, twenty-five pounds, on demand, for value received.

£. 25 Timolean Jefferson.

London, 6th June, 1798.

Six months after date, I promise to pay to John Andrew, Esq. or order, fifty-six pounds, ten shillings, for value received.

£. 56 10 Abraham Shorter.

I promise to pay to Mr Isaac Turnbull, one hundred pounds in manner following, viz. twenty pounds three months after date, twenty pounds at six months, and the remaining sixty pounds at twelve months, for value received. Witness my hand at Newcastle upon Tyne, September 4th, 1798.

£. 100 John Justice.

INLAND BILLS OF EXCHANGE.

£. 100. Berwick, 7th July, 1797.

At sight, pay Mr James Schoolmaster, or order, one hundred pounds, for value received of Mr John Carman, and place it to account, as per advice from

Adam Scott.

To William George, Merchant,
Newcastle upon Tyne.

£. 10 15. Newcastle upon Tyne, 7th May, 1797.

Fifteen days after date, pay Mr Humphy Irwin, or order, ten pounds fifteen shillings, for value received of Thomas Mc. Dougal Esq. and place it to account, as per advice from

To James Johnson, merchant, Peter Bailie.
Leeds.

A GENTLEMAN'S ORDER TO HIS BANKER.

No. 15. London, 6th Sept. 1797 £. 100

Sir, pay Mr Gregory Poland, or bearer, one hundred pounds, on demand, and place it to my account.

To Mr Henry Keeper, Zachary Johnson.
Russel-street, London.

FOREIGN BILLS.

Newcaſtle, 17th Feb. 1797, 579 Piaſters, at uſance*,

At uſance, pay this my firſt of exchange, to Mr William Cleminſon, or order, five hundred and ſeventy-nine piaſters, value received of Alderman Ward, Eſq. and place it to account, as per advice from -

Samſon Hanover.

To Mr George Ironſide,
merchant, Cadiz.

London, 8th December, 1796.

179*l.* ſterling, at 33*s.* 10*d.* flemiſh per *l.* ſterling, uſance,

At uſance, pay this my firſt of exchange, to Mr Cuthbert Armſtrong, or order, one hundred and ſeventy-nine pounds ſterling, at thirty-three ſhillings and tenpence flemiſh per pound ſterling, value received of Joſias Turner, Eſq. and place the ſame to account, as per advice from

To Van. Trump, merchant, Hamburgh. Abraham Truſty.

EXERCISES.

1. Mr Robert Robſon pays to James Dealer, on 12th Feb. 1797, thirteen pounds in full: Required a proper receipt from James Dealer?

2. William Shoemaker pays to Edward Lawyer, on 4th January, 1796, ten pounds in full for a year's rent, due Nov. 11th, 1795: Required the receipt?

3. Mr John Scott lends to James Careleſs, on the 8th of Auguſt, 1796, ten pounds ten ſhillings, which he promiſes to pay ſix months after date; Required the form of the promiſſory note?

4. Mr Jonathan Ambroſe receives a note of fifty pounds, on 1ſt May, 1797, from Tobias Truſty, payable to himſelf, or bearer, three months after date: Required the form of the note?

5. John Samuels receives, on the 19th April, 1798, for his maſter Ralph Stationer, eighty pounds, from James Punctual, in part of a bill of one hundred pounds; What receipt ought the ſervant to give?

* Uſance, in foreign bills, means a certain fixt time allowed between the date of the bill, and when it muſt be paid; which varies according to cuſtom and the diſtance of the place.

6. On the 5th of September, 1798, Mr John Anderſon, for his employer William Lintot, Eſq. pays to Francis Blenkinſop, the clerk of Meſſrs Chapman and Co. five hundred pounds in full: Required the form of the receipt that muſt be given to John Anderſon?

7. On the 7th Feb. 1797, Mr James Taylor goes to the ſhop of Mr William Clothier, and takes off a ſuit of clothes, which conſiſts of the following articles, *viz.* 2⅜yds. of ſuperfine broad cloth, at 19*s.* per yard—3½yds. ſhalloon, at 1*s.* 10*d.*—¾yd. flannel, at 1*s.* 2*d.*—thread, ſilk, and twiſt, 1*s.* 11*d.*—buckram, canvas, &c. 1*s.* 7*d.*—17 buttons, at 8*d.* per doz. and 10 at 4½*d.* per doz. Draw out the bill of parcels, and give a receipt for the ſame?

8. On 7th March, 1796, Andrew Paywell, ſteward to Sir James Liberal, pays to John Careful, one hundred and fifty pounds, for one year's rent, due Feb. 2d. Required the form of the receipt which Careful muſt give Paywell?

9. On May 7th, 1795, Mr James Grocer receives an order from John Greatman, Eſq. for 3¾*lb.* of green tea, at 9*s.* 7*d.* per lb.—1½lb. of bohea, at 4*s.* 9*d.*—¼lb. nutmeg, at 9½*d.* per oz.—2 ſugar loaves, wt. 40¾lb. at 7¼*d.* per lb.—one ſtone of ſoap, at 5¾*d.* per lb.—which are carried by James Underling, ſervant to James Grocer, who receives the money: Draw out the bill of parcels, and give the form of the receipt which the ſervant muſt give upon receiving the money?

10. March 9th, 1798, Mr George Forſter of Newcaſtle upon Tyne, draws upon Mr Humphrey Jackſon, of Amſterdam, for one hundred and twenty pounds ſterling, exchange at 34*s.* 6*d.* flemiſh per *l.* ſterling; payable to Joſeph Wholeſale, or order, at uſance, for value received of James Turnbull: Required the form of the bill?

11. Mr Roger Maſterton buys of Mr Elias Pinkerton, on January 4th, 1797, 4⅛yds. fine hunter, at 5*s.* 3*d.* per yard—⅞yd. Genoa velvet, at 19*s.* per yard—29 buttons, at 1*s.* 4*d.* per doz.—2⅛yds fine dimity, at 5*s.* 3*d.* per yard—1¼yd. linen, at 3*s.* 1½*d.* Make out the bill of parcels.

12. Mr Joſeph Meanwell of Newcaſtle, is indebted to Francis Kay, of Liverpool, fifty pounds, for which ſum he draws on Mr Samuel Bedford, merchant of Liverpool, payable to Francis Kay, or order, and place it to account, as per advice: Required the form of the bill?

13. Mr John Gelderton of Edinburgh owes to Mr Silveſter

Little, of York, thirty pounds, for which ſum, Little draws July 8, 1798, at 12 days after date, payable to Mr Peter Emerſon: Required the form of the bill?

14. On 25th July, 1795, George Winton received from James Elliot, executor of the laſt will and teſtament of Sir Thomas Lowthier, two hundred pounds as a legacy left to him by the ſaid Sir Thomas Lowthier: Required the form of the receipt to be given James Elliot?

15. Mr William Lawſon ſends an order to Mr Walter Wine-merchant, for 1*g*. 2*q*. 1*p*. of gin, at 10*s*. 6*d*. per gallon—2¼ gallons of brandy, at 3*s*. 6*d*. per quart—3*q*. 1*p*. of rum, at 9*s*. 10*d*. per gallon—3 doz. of red port, at 19*s*. 6*d*. per dozen: Draw out the bill of parcels and give a receipt for the ſame?

16. Jonathan Summers lends Robert Walton ten guineas, for which he receives his note payable ſix months after date: Quere the form of the note?

17. Mr George Retail deſires Mr Timothy Cheeſemonger to ſend him the ſtate of the account current between them, which Cheeſemonger complies with, and ſends him the following, *viz*. That he, George Retail, bought from Timothy Cheeſemonger, on 3d March, 1796, 8 old Cheſhire cheeſes, each weighing 1*q*. 12*lb*. at 4¼*d*. per *lb*.—on the 24th of the ſame month, 7 firkins of butter, at 1*l*. 4*s*. 6*d*. per firkin. May 4th, 10 Yorkſhire cheeſes, weighing in all 3*cwt*. 3*qr*. 17*lb*. at 1*l*. 10*s*. 6*d*. per *cwt*.—July 7th, 12 flitches of bacon, wt. 80*ſt*. 12*lb*. at 3*s*. 9½*d*. per ſtone—and on Auguſt 12th, 5 Glouceſterſhire cheeſes, each weighing 17*lb*. at 3¼*d*. per *lb*. Mr George Retail paid Mr Cheeſemonger on June 4th, ſeven pounds—On Auguſt 6th, a draught on Mr Sanderſon for ten pounds, and on the 30th of the ſame month he paid ten pounds more; now ſuppoſe George Retail to pay Cheeſemonger the balance, upon receiving the account: Required the form of the account current, and alſo of the receipt?

THE END.